

AA AUTOMOTIVE INDUSTRIES

**AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT**

OCTOBER 1, 1955

In This Issue

New Jets and Airliners Featured at Farnborough
Intense Activity in Fuel Injection Research for Cars
More Highlights on Greatest Display of Machine Tools
Important Changes in Ford and Mercury Cars for '56
Latest Equipment Amassed at National Aircraft Show
Passenger Car Heater That Is Independent of Engine

COMPLETE TABLE OF CONTENTS, PAGE 3

A CHILTON PUBLICATION

7 benefits received by switch to STANOSTAMP Compound C

Jagemann Stamping Company, Manitowoc, Wisconsin, benefited seven ways by switching to STANOSTAMP Compound C. Finished ferrules drawn from 19 gauge cold roll steel were being badly scored. At the same time dies were being scratched and excessive heat experienced in the press. Standard Oil lubrication specialist R. E. O'Brien suggested STANOSTAMP. The result:

1. Production increased 20%
2. Die maintenance reduced 30%
3. Spoilage reduced
4. Finish improved
5. Galling minimized
6. Cooler machine operation
7. Washability improved

The results add up to this: There is a combination in the field of industrial lubrication that is hard to beat. It is (1) Standard Oil lubrication specialists capable of giving technical help and (2) Top quality products that deliver results.

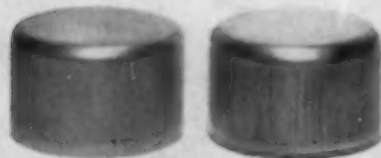
STANOSTAMP Compound C is a water emulsifiable paste for heavy drawing operations. It contains an inert, non-abrasive mineral filler for protection of dies and work, is readily cleaned from work in conventional washing equipment. In the Midwest, your nearby Standard Oil lubrication specialist will be glad to tell you more about STANOSTAMP. Call him. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



WAVY



Father and son inspect ferrules. William P. Jagemann (left), President, and son William T. Jagemann note improved finish on work produced using STANOSTAMP.



Air hose ferrules. One at right produced before switch to STANOSTAMP, one at left produced after conversion to this farming compound. Scoring of dies as well as work occurred before switch.

STANDARD OIL COMPANY
(Indiana)



WORK-BOAT WORKS MORE WITH NEW POWER!

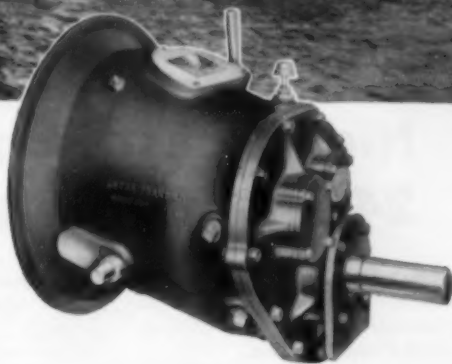


PAGES

Salmon boat repowered by Haffers Limited, Vancouver, B. C.
... with Cotta HA transmission

Installing new diesel engines in British Columbia salmon boats required reduction gear with a reduction ratio of 3.00:1 for front end winch drive application. Cotta Model HA Reduction Unit met this requirement. Work boats of this type demand the dependable performance and long, trouble-free service life that is characteristic of every Cotta unit.

If you have a heavy-duty power transmission problem on any type of equipment, with input torque ranging from 150 to 2000 foot pounds, Cotta standard or "engineered-to-order" transmissions will provide dependable service with outstanding performance at a very low cost.



Broad range of ratios

Input torque from 150 to 1350
foot pounds

For use on cranes, shovels, rock crushers,
generators, pumps, etc.

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions, and complete specifications sent free on request. Just state your problem—COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



COTTA

**HEAVY-DUTY
REDUCTION UNITS**

"Engineered-to-order"

7 benefits received by switch to STANOSTAMP Compound C

Jagemann Stamping Company, Manitowoc, Wisconsin, benefited seven ways by switching to STANOSTAMP Compound C. Finished ferrules drawn from 19 gauge cold roll steel were being badly scored. At the same time dies were being scratched and excessive heat experienced in the press. Standard Oil lubrication specialist R. E. O'Brien suggested STANOSTAMP. The result:

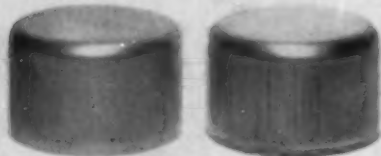
1. Production increased 20%
2. Die maintenance reduced 30%
3. Spoilage reduced
4. Finish improved
5. Galling minimized
6. Cooler machine operation
7. Washability improved

The results add up to this: There is a combination in the field of industrial lubrication that is hard to beat. It is (1) Standard Oil lubrication specialists capable of giving technical help and (2) Top quality products that deliver results.

STANOSTAMP Compound C is a water emulsifiable paste for heavy drawing operations. It contains an inert, non-abrasive mineral filler for protection of dies and work, is readily cleaned from work in conventional washing equipment. In the Midwest, your nearby Standard Oil lubrication specialist will be glad to tell you more about STANOSTAMP. Call him. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



Father and son inspect ferrules. William P. Jagemann (left), President, and son William T. Jagemann note improved finish on work produced using STANOSTAMP.



Air hose ferrules. One at right produced before switch to STANOSTAMP, one at left produced after conversion to this farming compound. Scoring of dies as well as work occurred before switch.

STANDARD OIL COMPANY
(Indiana)



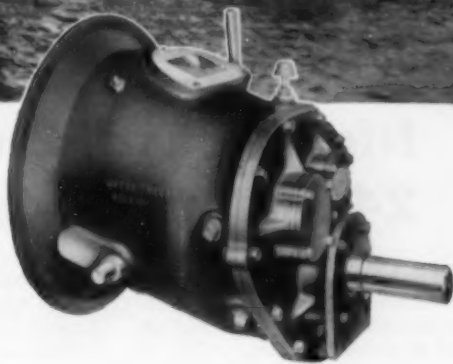
WORK-BOAT WORKS MORE WITH NEW POWER!



Salmon boat repowered by Haffers Limited, Vancouver, B. C.
... with Cotta HA transmission

Installing new diesel engines in British Columbia salmon boats required reduction gear with a reduction ratio of 3.00:1 for front end winch drive application. Cotta Model HA Reduction Unit met this requirement. Work boats of this type demand the dependable performance and long, trouble-free service life that is characteristic of every Cotta unit.

If you have a heavy-duty power transmission problem on any type of equipment, with input torque ranging from 150 to 2000 foot pounds, Cotta standard or "engineered-to-order" transmissions will provide dependable service with outstanding performance at a very low cost.



Broad range of ratios

Input torque from 150 to 1350
foot pounds

For use on cranes, shovels, rock crushers,
generators, pumps, etc.

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions, and complete specifications sent free on request. Just state your problem—COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



COTTA

**HEAVY-DUTY
REDUCTION UNITS**

"Engineered-to-order"



Passenger Model Mercedes cars have adopted nickel cast iron brake drum liners because of the notable successes of Mercedes-Benz "Silver Arrow" racing cars so equipped in rigorous trials such as the Le Mans 24-Hour Road Race.

Nickel cast iron lines brakes of new 240 hp Mercedes 300 SL series cars

THIS RADIALLY FINNED brake drum for the new Mercedes model 300 SL embodies an Al-Fin bonded friction liner of nickel cast iron.

Fortified with nickel, the liner not only resists uneven wear from thermally induced stresses, but it also dissipates intense frictional heat from internal surfaces through the aluminum to the air, thus preventing "brake fade." In addition, it resists warpage.

And particularly important, in spite of irregular but rigorous cycles of heating and cooling, it resists heat-checking.

Life expectancy of cast iron parts

can be materially increased by adding suitable amounts of nickel to properly adjusted base mixtures. In this way you improve structure, mechanical strength, thermal expansion characteristics and stability at elevated temperatures.

Nickel alloys have answered exacting demands throughout the automotive and allied industries. Whatever your metal difficulty, let us give you the benefit of our wide practical experience in this field.

Write for List A of available publications. It includes a simple form that makes it easy for you to outline your problem.



The friction liner of this Mark II type radially finned brake drum contains 0.80-1.00% nickel along with molybdenum and chromium. Ferrous liners are bonded into the cast aluminum drums by the Al-Fin process, a development of the Al-Fin Div., Fairchild Engine and Airplane Corp., Deer Park, N. Y.



THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street
New York 5, N.Y.

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE

PUBLISHED SEMI-MONTHLY

OCTOBER 1, 1955

VOL. 113, NO. 7

FEATURES

Farnborough Aircraft Show. By David Scott....	49
SAE Tractor Meeting	53
Fuel Injection Research. By Thomas Mac New....	54
New Car Heater Is Independent of Engine.....	57
Features of Mercury Car Line for 1956.....	58
Many Advancements in Modern Machine Tools Displayed at Chicago Show. By Paul C. Kennedy	60

International's New S-Line Trucks.....	65
Ford for 1956 Offers Two V-8's and a Six.....	66
Equipment of All Types Amassed at National Air- craft Show. By Andrew W. Shearer.....	68
Scintilla Aircraft Ignition Conference.....	71
1956 Ford Truck Engines Increased in Power.....	72
New Spray Coating Process for Valves.....	102

NEWS PREVIEWS

Chevrolet Offers Harness As Well As Seat Belts..	33
New Assembly Plants Included in Chrysler Plans	33
Borg-Warner Is Building New Research Center....	33
American Motors Corp. Shuts Calif. Operation..	34
Ford Increases Its Prices on 1956 Car Line.....	34
Wiles Predicts Eight Million Car Sales in 1955..	35
Cadillac to Boost Output 4000 Units in 1956.....	35
Ford Gets Contract to Appraise Tank Program..	36
Lincoln Hikes 1956 Prices from \$10 to \$243.....	36
Zollner Plans Permanent Mold Aluminum Unit....	37
Five-Piece Safety Package Offered in '56 Fords..	38
Thompson Sets Up Group to Study Atom Work..	39
Warner & Swasey Seeks to Buy Duplex Truck Co.	100

DEPARTMENTS

High Spots of This Issue.....	31
News of the Automotive and Aviation Industries	33
Men in the News.....	41
Machinery News. By Thomas Mac New.....	79
New Plant and Production Equipment.....	81
Free Literature and Free Information Service....	89
New Automotive and Aviation Products.....	92
Observations. By Joseph Geschelin.....	94
Metals. By William F. Boericke.....	96
Automation News Report. By Paul C. Kennedy....	98
Shorties	100
On Our Washington Wire	114
Calendar of Coming Events.....	124

Business Department Staff	31
Chilton Officers and Directors	31
Advertisers' Index	140

EDITORIAL STAFF

JAMES R. CUSTER
Editor

H. H. ROBERTS
Engineering Editor

THOMAS MAC NEW
Market Research Editor

PAUL C. KENNEDY
Machinery Editor

ANDREW SHEAREN
News Editor

ROBERT P. HOMER
Art Editor

MARCUS AINSWORTH
Statistical Editor

HOWARD KOHLBRENNER
Art Director

DETROIT

Joseph Geschelin, Detroit Editor
Leonard Westrate, News Editor, Detroit
Edward Janicki, Associate Ed., Detroit

WASHINGTON

George H. Baker, Washington Editor
Ray M. Stroupe, Washington News Editor
Neil R. Regimbal, Washington News Ed.

LOS ANGELES
R. Raymond Kay
Pacific Coast Editor

PARIS
W. F. Bradley
European Correspondent

LONDON
David Scott
British Correspondent

Paul Wooten, Washington Member, Editorial Board

As part of its worldwide automotive and aviation news coverage, AUTOMOTIVE INDUSTRIES is serviced by International News Service and has editorial correspondents in major United States and foreign industrial centers.

MEMBER



Copyright 1955 by Chilton Company (Inc.)



National Business
Publications, Inc.



Audit Bureau
of Circulations

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1965; Dealer and Repairman (monthly), October, 1965; the Automobile Magazine (monthly), July, 1967; and the Horseless Age (weekly), founded in 1905, May, 1918.

EDITORIAL EXECUTIVE OFFICES, Chilton and 56th Sts., Philadelphia 19, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Co., Chilton & 56th Sts., Phila. 19. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Before Postage Guaranteed. Subscription price: United States, United States Possessions, 1 year \$2.00, 2 years \$3.00. Canadian and Foreign, 1 year \$5.00, 2 years \$8.00; single copies, 25 cents, except Statistical Issue (Mar, 1954), \$1.00.



Every small worm gear unit is built to precision standards—as outstanding in quality and performance as larger size Cleverlands. Illustrated above are the 10 AT (left) and 00 D (right) speed reducers.

Enjoy the benefits of worm gear drives in smaller CLEVELAND speed reducers

WHEN you want a quiet, powerful, dependable drive for a small machine, choose a Cleveland Worm Gear Speed Reducer.

As built by Cleveland, the worm gear reducer is a drive of many advantages:

1. It is compact and inherently quiet, transmitting power with smooth, uninterrupted torque flow.
2. Its right-angled design saves valuable space.
3. It has a minimum of moving parts.
4. Shock load resistance and other factors of safety are high.
5. Rate of wear of case hardened steel worm on nickel-bronze gear is very low, insuring long life.

Write for Bulletin 114F which illustrates and gives engineering data on smaller size Cleverlands—many now available for immediate delivery. The Cleveland Worm and Gear Company, 3274 E. 80th St., Cleveland 4, O.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.



CLEVELAND

Worm Gear

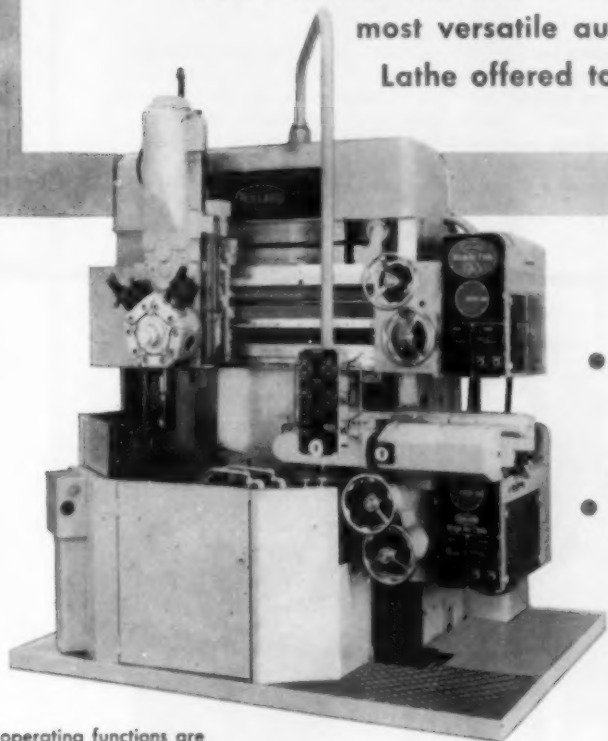
Speed Reducers

don't **BUY BULLARD**
unless **YOU WANT THE BEST!**

Yes, Bullard Cut Master, Model 75 with

Man-Au-Trol Conversion Unit is the best . . .

most versatile automatic Vertical Turret
Lathe offered to industry today



All operating functions are automatically initiated and controlled by one function control drum and two detector drums in Man-Au-Trol: Table Speeds (20 Available), Feeds (16 Available), Head Travel in feed or traverse, right or left, up or down or 45° in any quadrant and Turret Indexing.

Since the function control drum can be pre-set for a given job in advance, the machine down time for job change-over is reduced to a minimum.

The Man-Au-Trol Conversion Unit can be applied to any or all heads of Cut Master, Model 75 right in your plant.



Your Bullard Sales Engineer will be glad to explain the many other advantages offered by Man-Au-Trol — your best buy in an automatic vertical turret lathe — call him or write for our new catalog.

THE BULLARD COMPANY

286 Canfield Avenue • Bridgeport 2, Connecticut

Please send me a copy of the
NEW MAN-AU-TROL, MODEL 75 CATALOG

NAME _____

COMPANY _____ POSITION _____

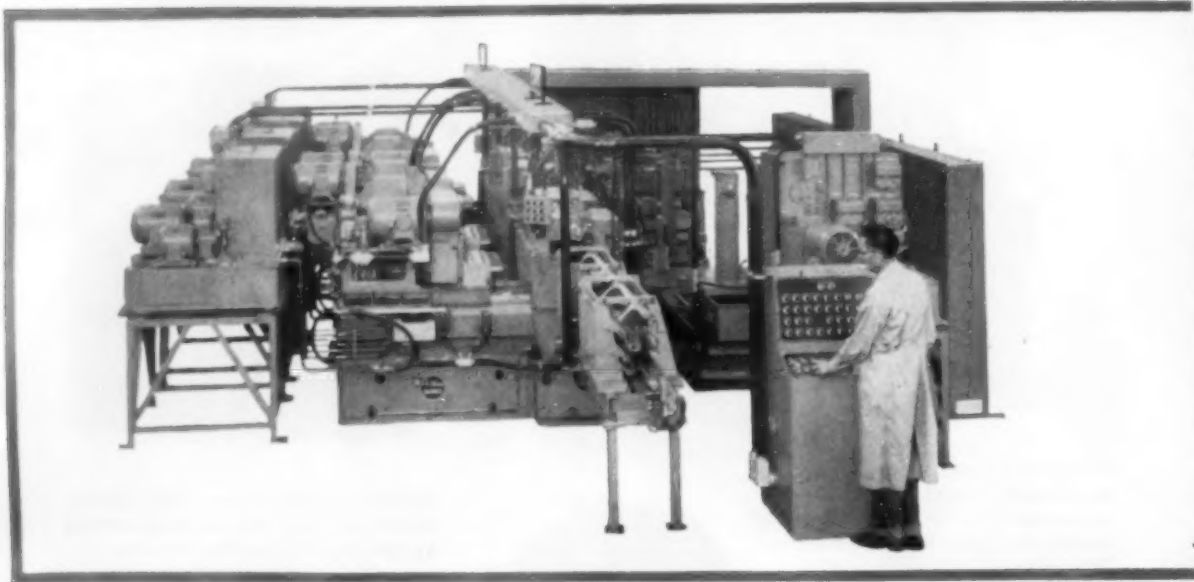
ADDRESS _____

CITY _____ ZONE _____ STATE _____

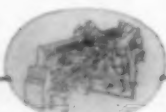
A PART OF PACKARD'S

NEW MANUFACTURING FACILITIES

★The three examples shown here are representative of the many machines built by W. F. & John Barnes for Packard. Each represents a profitable solution to the problem of saving time and cutting costs. All have been especially engineered to meet a specific production problem. Whether your production requires large or small machines, you'll find that designing and engineering are coordinated at Barnes to provide a complete machine tool building service from one convenient source. Write for more facts today.



SPECIAL AUTOMATIC BORING MACHINE—Finish machines V-8 cylinder head valve seats and stem holes. Corrective operations after boring, reaming, and seating operations are eliminated by holding total concentricity within .0005" (total indicator reading).



Special
Machine Tools

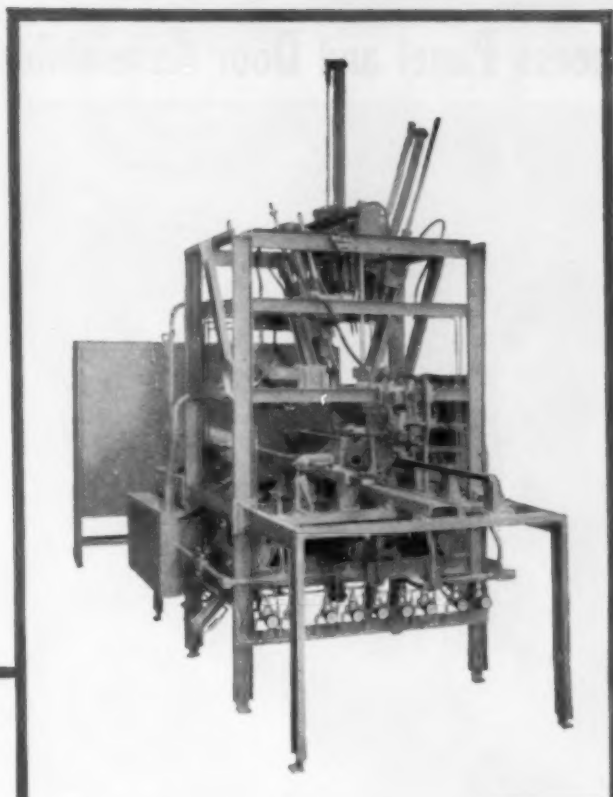


Special
Conveyor Units



Special
Process Equipment

MULTIPLE SPINDLE DRILLING • BORING • TAPPING MACHINES

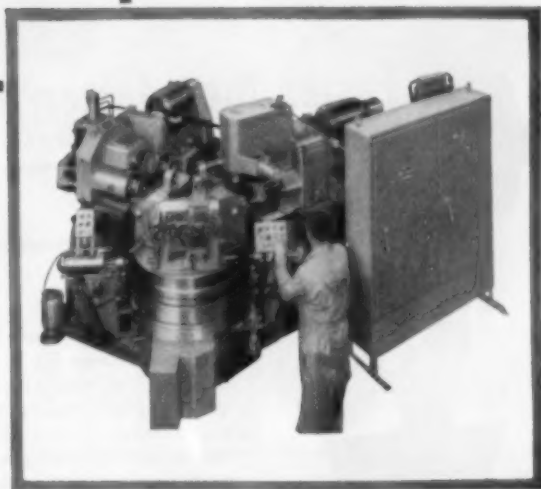


Packard

AUTOMATIC PROBE STATION — Test probes 36 oil holes in cylinder blocks for obstructions. Each probe operates independently of others and if obstruction is encountered, a light on master panel indicates exact hole.

Designed and built by
W. F. & JOHN BARNES CO.
PROCESS EQUIPMENT DIV.

TWO-WAY ROTARY TABLE MACHINE— Mills, drills, and reams water pump bodies at the rate of 109 pieces per hour. Operator loads and unloads workpieces while machine is in operation.



Builders of Better Machines and Equipment Since 1872



Special
Electrical Controls



Food
Machinery

W. F. & JOHN BARNES COMPANY

402 SOUTH WATER STREET, ROCKFORD, ILLINOIS

AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

AUTOMOTIVE INDUSTRIES, October 1, 1955

Simplify Your Access Panel and Door Assemblies...



Fasten them faster with Quick-Lock

Fastening removable access doors and panels need not be a laborious and costly production or assembly operation—not if they're fastened with QUICK-LOCK.

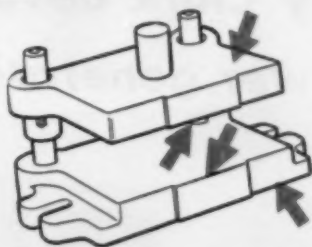
Designed for simple installation, QUICK-LOCK requires no special tools. It speeds up mounting and demounting detachable panels with only a 90° turn required to lock and unlock it in a jiffy.

The flexible mounting and tapered stud makes QUICK-LOCK ideal for assembling curved sheets and insures a tight fit when locked. Stud is self-ejecting when unlocked. Minimum deflection is assured—only initial loads are carried by the helical spring. Solid supports take up increased loads.

Industrial and agricultural equipment manufacturers would do well to analyze the cost-saving features of QUICK-LOCK's simple design. A good way would be to call in a Simmons Engineer and discuss the economy of a QUICK-LOCK installation as compared to your present fastening method. Why not send for him today?

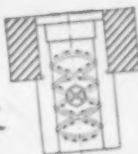
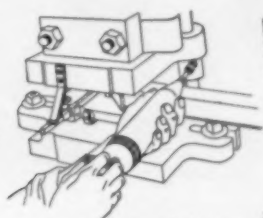
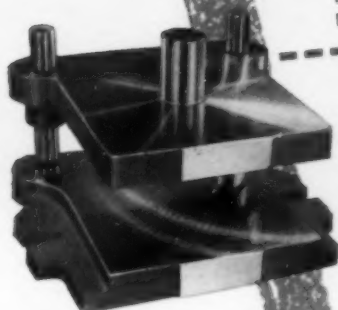
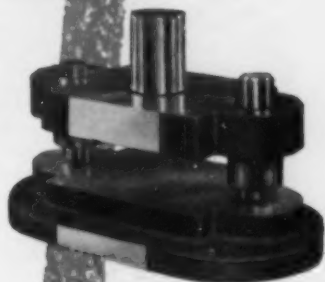
SIMMONS FASTENERS

SIMMONS FASTENER CORPORATION • 1749 NORTH BROADWAY, ALBANY 1, N. Y.



all horizontal surfaces ground

Now, in addition to the vital die surfaces of all steel or semi-steel sets, all horizontal surfaces, including tops of punch holders, are ground with the same precision that has made Danly are ground with the same precision that has made Danly a quality the accepted standard. Surface grinding assures a flat, true working surface, saves tooling time and improves accuracy.



Shoulder bushings oil lubricated

All Danly Standard Sets equipped with shoulder bushings are designed for easy, pressurized oil lubrication. Fittings in bushing shoulder are easily reached from front or side. Cut-away sketch shows oil channels in bushing that form lubrication reservoir for long runs and maintain oil film with a minimum of clogging or gumming.

New features like these keep DANLY ahead

Throughout the years, the rigid precision standards of Danly have made Danly Die Sets the recognized standard for quality. Now Danly Die Sets offer you two new features to save hours in the die shop, make tooling-up much faster and assure longer die life. All new Danly Die Sets have an oil lubrication

system for shoulder bushings and all horizontal surfaces are ground to assure a true working surface for die making. Danly's nationwide system of assembly branches is ready to serve you. Call Danly today.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

HERE ARE THE DANLY PLANTS THAT SERVE YOU

BUFFALO 7
1807 Elmwood Avenue
CHICAGO 50
2100 S. Laramie Avenue
CLEVELAND 14
1550 East 33rd Street
DAYTON 7
3196 Delphos Avenue
DETROIT 18
1549 Temple Avenue

GRAND RAPIDS
113 Michigan Street, N.W.

INDIANAPOLIS 4
5 West 10th Street

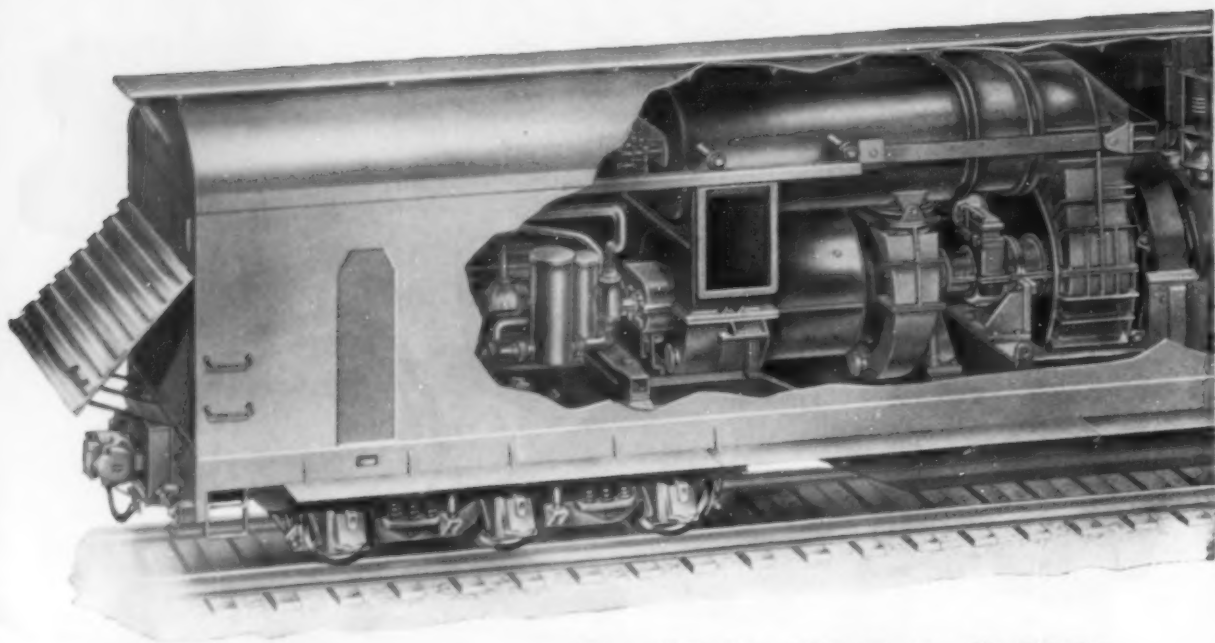
LONG ISLAND CITY 1
47-28 37th Street

LOS ANGELES 54
Dunsmuir Metals & Supply Co.
4390 South Alameda

MILWAUKEE 2
111 E. Wisconsin Avenue
PHILADELPHIA 40
511 W. Courtland Street
ROCHESTER 6
33 Rutter Street
ST. LOUIS 8
3740 Washington Blvd.
SYRACUSE 4
2006 West Genesee Street

DANLY

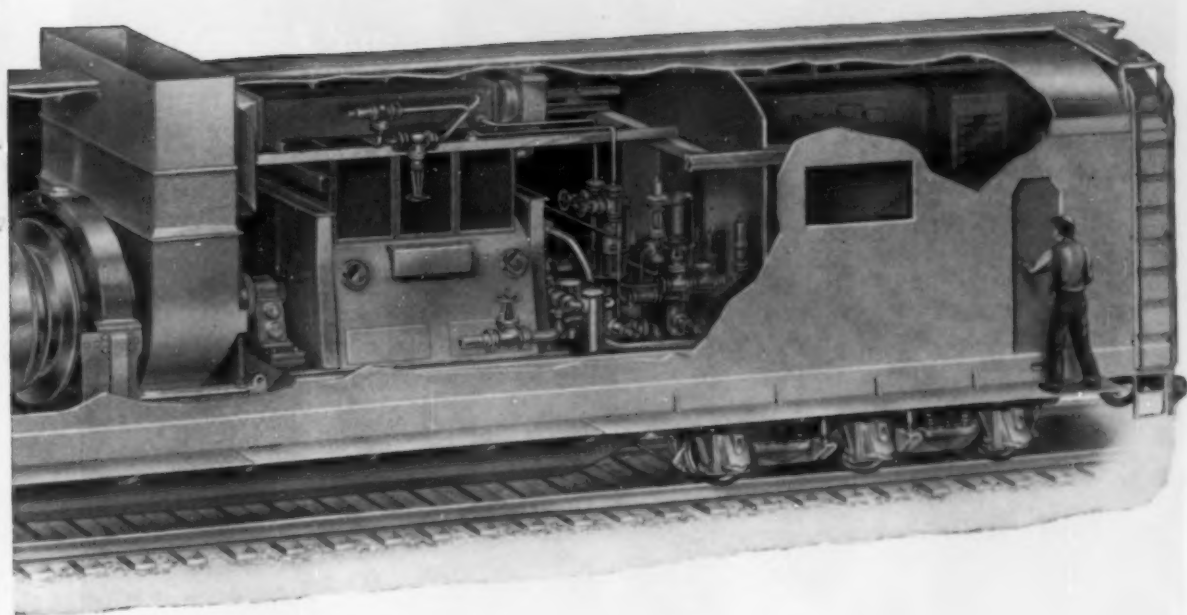
Revolutionary Clark development in mobile power generation



A PACKAGED

KEY FEATURES

- 1 COMPLETELY SELF-CONTAINED**
Requires only connection to fuel source and electrical load.
No water nor outside power needed.
- 2 ONE-MAN OPERATION**
Simple, pneumatic controls. Complete, built-in, dead front switchgear.
- 3 MOVED AT HIGH SPEEDS**
Can be hauled on regular passenger or freight train service. All components specifically designed for mobile operation. Special, heavy duty car.
- 4 QUICKLY PLACED IN SERVICE**
No site preparation required. Operates on any reasonably level track.
- 5 3-POINT SUPPORT**
Car flexing does not affect alignment of power unit.
- 6 DUAL FUEL OPERATION**
Burns wide range of liquid or gaseous fuels simultaneously or individually.
- 7 SPLIT SHAFT DESIGN**
No alignment problem. No step-down gears between turbine and load. No physical connection between turbines.
- 8 THERMO-ELASTIC DESIGN**
Hot parts expand without stress. No bearing misalignment.
- 9 LONG LIFE — LOW TEMPERATURE**
Minimum blade life of 100,000 hours.
- 10 AIR COOLED — NO WATER REQUIRED**
- 11 DUAL MULTI-STAGE HIGH AND LOW PRESSURE TURBINES**
- 12 LIFETIME SINGLE COMBUSTION CHAMBER**
- 13 MINIMUM RADIATION**
All exposed surfaces cool enough to touch.
- 14 FLEXIBLE ELECTRICAL CHARACTERISTICS**
Dual frequency. Operates in parallel with existing facilities or independently.
- 15 UNUSUAL ACCESSIBILITY**
All parts readily accessible for rapid inspection and servicing.



5500 KW POWER PLANT

Completely self-contained in a single R.R. car

The Navy ordered it. Clark built it — a packaged 5500 KW mobile power plant completely self-contained in a single railroad car, for emergency use by the Bureau of Yards & Docks.

Featuring a completely new, Clark designed combustion gas turbine, driving a synchronous generator, the unit is specifically designed as a mobile emergency power station to supply a substantial block of power on short notice. Clearly, this is a development that offers many opportunities to the armed forces, civil defense, public utilities and industry.

Furthermore, the unique gas turbine which drives the generator is extremely well suited as a matching driver for centrifugal compressors serving the gas transmission, refining, process and other industries.

Clark engineers will gladly furnish details and discuss specific applications with you. Complete brochure mailed on request.

CLARK BROS. CO. • OLEAN, N. Y.

Offices in Principal Cities throughout the World

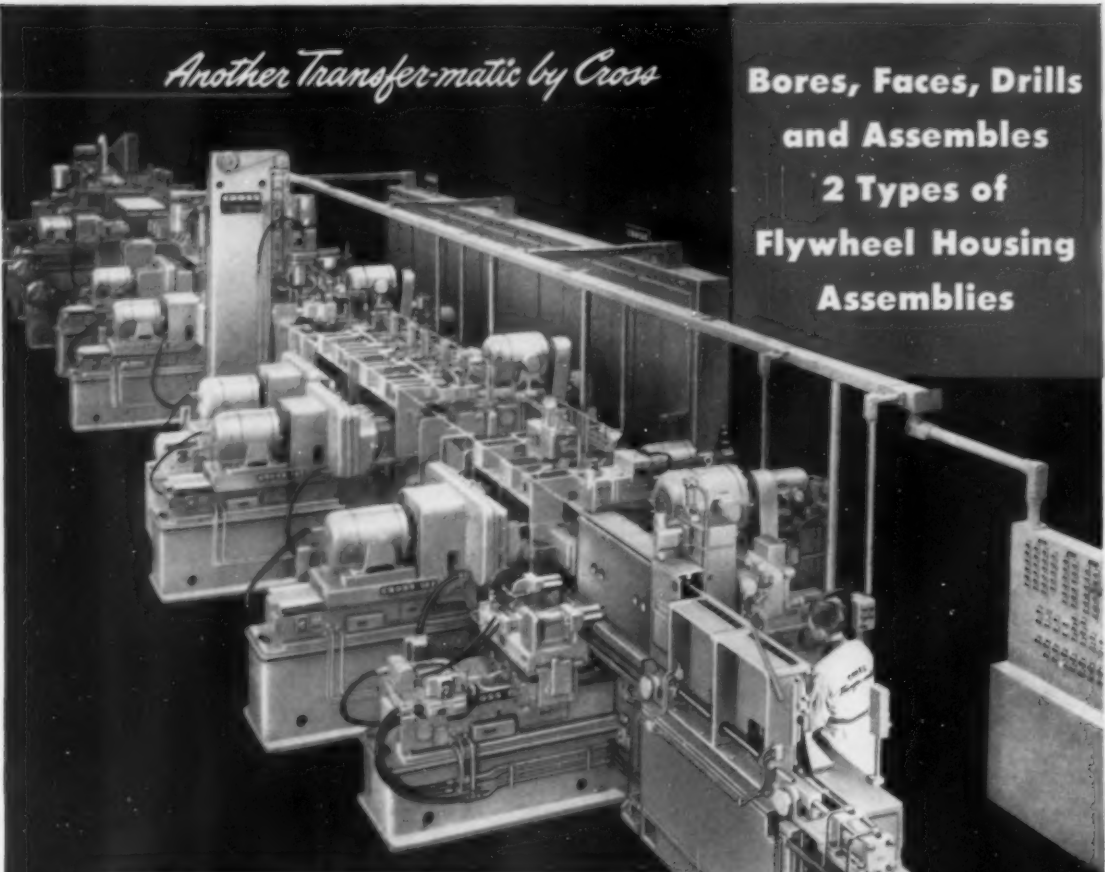
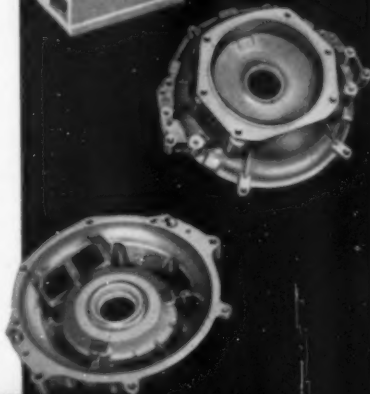
CLARK



**TURBINES
ENGINES
COMPRESSORS**

Another Transfer-matic by Cross

**Bores, Faces, Drills
and Assembles
2 Types of
Flywheel Housing
Assemblies**

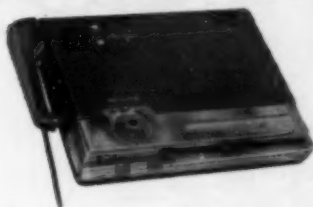
- 
- ★ Processes 2 parts at a time for 2 different engine models.
 - ★ Rough and finish turns and faces engine and transmission mounting faces; drills, bores, chamfers, reams and taps all holes; assembles center bearing and 2 dowels; finish bores and inspects center bearing after assembly; washes, dries parts for final assembly.
 - ★ 314 pieces per hour at 100% efficiency.
 - ★ 20 stations: 1 loading; 10 machining; 2 assembling; 4 inspecting; 2 cleaning; 1 unloading.
 - ★ Pre-set tools to reduce downtime for tool changing.
 - ★ Complete interchangeability of all standard and special parts for easy maintenance.
 - ★ Other features: Construction to J.I.C. standards; hydraulic feed and rapid traverse; hardened and ground ways; automatic lubrication.
- 

Established 1898

THE **CROSS** CO.
DETROIT 7, MICHIGAN
Special MACHINE TOOLS

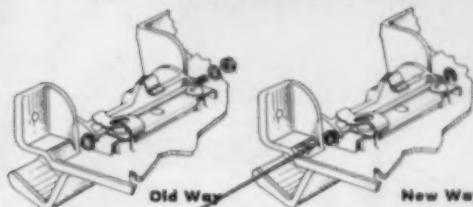
5 Waldes Truarc rings eliminate parts, speed assembly, in light, compact dictating machine

Edison's "V. P." Voicewriter



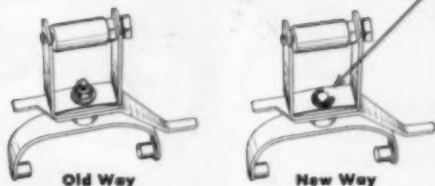
Edison engineers built this new dictating instrument for small size, light weight, and rugged performance. Waldes Truarc rings replace old fashioned fasteners, cut production costs; keep unit light, compact, and achieve faster more economical assembly.

Disc Lever Cover Assembly



Two Waldes Truarc E-Rings (Series 5133) replace nut, bolt, washer assembly, eliminate one component and assure precise alignment of parts. Truarc rings facilitate pivoting without binding. Production assembly time is decreased.

Lift Bracket and Fork Assembly



A single, easily assembled Waldes Truarc E-Ring (Series 5133) replaces nut-bolt-washer fastening. Free pivoting is assured, one component eliminated, labor and material costs reduced.

Clutch Plate Assembly



Two Truarc E-Rings eliminate staking operation, prevent damage to spring coil. Simple assembly operation speeds production, eliminates rejects, reduces labor and material costs.

Whatever you make, there's a Waldes Truarc Retaining Ring designed to improve your product... to save you material, machining and labor costs. They're quick and easy to assemble, and they do a better job of holding parts together. Truarc rings are precision engineered and precision made, quality controlled from raw material to finished ring.

36 functionally different types... as many as 97 different

sizes within a type... 5 metal specifications and 14 different finishes. Truarc rings are available from 90 stocking points throughout the U. S. A. and Canada.

More than 30 engineering-minded factory representatives and 700 field men are available to you on call. Send us your blueprints today. Let our Truarc engineers help you solve design, assembly and production problems, without obligation.

For precision internal grooving and undercutting... Waldes Truarc Grooving Tool

Send for new catalog supplement



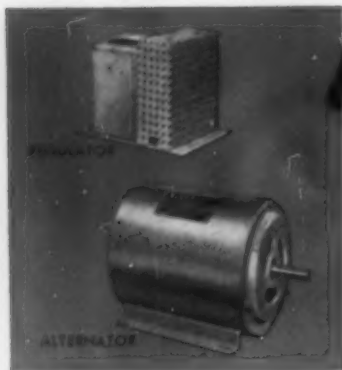
WALDES
TRUARC
RETAINING RINGS

Waldes Kahneer, Inc., 47-16 Astor Place, L. I. C., N. Y.
Please send the new supplement No. 1 which brings Truarc Catalog RR 9-52 up to date.
(Please print)

Name.....
Title.....
Company.....
Business Address.....
City..... Zone..... State.....

AY 107

WALDES TRUARC Retaining Rings, Grooving Tools, Pliers, Applicators and Dispensers are protected by one or more of the following U. S. Patents: 2,382,948; 2,411,426; 2,411,761; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,379; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,491,310; 2,509,081; 2,544,631; 2,546,616; 2,547,263; 2,558,704; 2,574,034; 2,577,319; 2,595,787, and other U. S. Patents pending. Equal patent protection established in foreign countries.



Now...TAKE AC POWER ANYWHERE A VEHICLE CAN GO!



MO-BIL-AC* driven by vehicle engine,
(mobile a-c power supply)
supplies up to 10 KW at 110-220 volts
takes little space

Designed by Star-Kimble to meet the need for a compact, portable source of AC at commercial voltage and frequency, MO-BIL-AC drives a-c powered tools, pumps, compressors, hoists and similar equipment in the field . . . *wherever a self-propelled vehicle can go.*

An outstanding feature of MO-BIL-AC is its low size-weight to power output ratio. To achieve it, a 2-pole alternator is excited by a compact, lightweight regulator with a selenium rectifier and magnetic amplifier working off the alternator output.

This unique S-K development also insures excellent transient response: upon application of full load, voltage recovers in one second or less. Speed of prime mover is not critical because regulator keeps output voltage proportional to output frequency. Thus, standard motors may be operated over a wide frequency range without overheating.

MO-BIL-AC is available in 3, 5 and 10 KW ratings, 60 cps, single and polyphase, any commercial voltage.

Write or phone for full descriptive literature.

*Trade Mark
applied for



Star-Kimble MOTOR DIVISION
MIEHLE PRINTING PRESS & MFG. CO.

215 Bloomfield Avenue

Bloomfield, New Jersey

Bloomfield 2-8160



Do You have to fit 'em into

SOFAS ON WHEELS?

It's a problem — for with still lower and more compact cars coming off the lines, yesterday's bulky seating can kill many sales.

Then why stick with it? Why indeed — for there is a new-type seating that eliminates bulky assemblies. It has all the smartness and glamour you could ask for — **PLUS**. The **PLUS** is extra comfort, **EXTRA ROOM** for driver and passengers!

Extra room is achieved with newly developed seat-units of one-piece molded **AIRFOAM**! Resulting from the combined efforts of automobile manufacturers and **AIRFOAM** Development Engineers, this revolutionary new seating is solving vital problems from drafting board to sales floor.

It may solve some problems for you, as well. For the story, to date — including significant case histories contact:

Goodyear, Automotive Products Dept., Akron 16, Ohio



AIRFOAM makes interiors roomier, more luxurious



Premolded **AIRFOAM** replaces expensive handwork—looks even richer



Exciting new seating ideas become practical with **AIRFOAM**



AIRFOAM can be your greatest sales-aid in years



Airfoam MADE ONLY BY **GOODYEAR**
THE WORLD'S FINEST, MOST MODERN CUSHIONING

Airfoam—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

AUTOMOTIVE INDUSTRIES, October 1, 1955



FOREMOST IN SCIENTIFIC DEVELOPMENT

IN THE REALM OF FORGING
DESIGN AND THE DEVELOPMENT
OF PROPER GRAIN-FLOW, WYMAN-
GORDON HAS ORIGINATED MANY
FORGING DESIGNS WHICH AT THE
TIME OF THEIR DEVELOPMENT
WERE CONSIDERED IMPOSSIBLE
TO PRODUCE BY FORGING.

WYMAN-GORDON

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER, MASSACHUSETTS

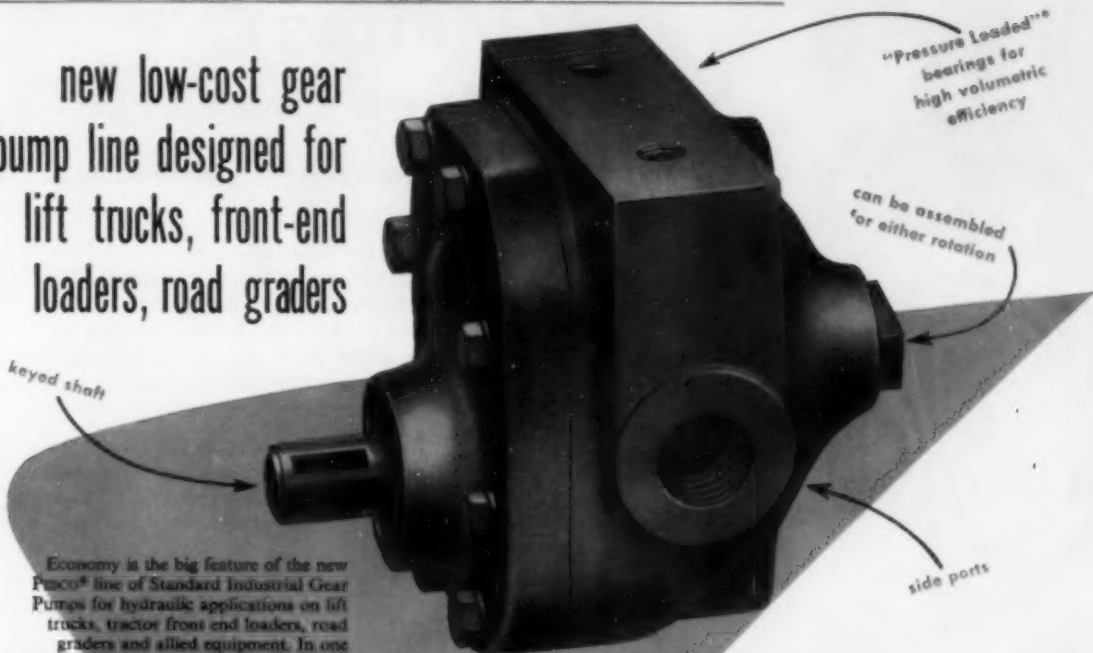
HARVEY, ILLINOIS

DETROIT, MICHIGAN

New from Pesco!

standard industrial hydraulic pumps . . .

new low-cost gear pump line designed for lift trucks, front-end loaders, road graders

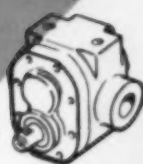


Economy is the big feature of the new Pesco® line of Standard Industrial Gear Pumps for hydraulic applications on lift trucks, tractor front end loaders, road graders and allied equipment. In one standardized body casting, Pesco can give you a choice of three displacement sizes and three mounting arrangements at a price you will want to investigate.

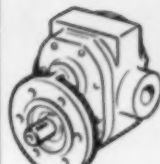
And these pumps are not built down to a price. They are Pesco quality in every aspect of design and manufacture. For example, they incorporate Pesco's patented "Pressure Loaded" bearings for maximum efficiency and sustained new pump performance throughout an extra-long service life.

If you want to build superior hydraulic performance *plus* economy into your off-the-road or materials handling equipment, get the full story on these new Pesco Pumps. Contact your local Pesco sales engineer or write: PESCO, 24700 North Miles Road, Bedford, Ohio.

three convenient mounting arrangements:



base



round flange



magneto flange

available in three popular capacities:

Pump Model Series	Rated Flow GPM	Displacement Cu. In.	Pressure PSI	Rated Speed RPM
051002	10.0*	1.32	2000	2000
052973	12.0	1.56	2000	2000
052941	16.0	1.93	1900	2300

*Pesco's patented principle of gear pump construction.



BORG-WARNER CORPORATION
24700 NORTH MILES ROAD • BEDFORD, OHIO



70 SIZES

P. R. MALLORY & CO. INC. of MALLORY Silver Rivet Contacts Stocked for Immediate Delivery

If you use fine-silver headed rivet contacts, you can save the time of designing, tooling and producing "specials", by ordering from Mallory's standard stock list. Many manufacturers have already found this a time-saving, economical way to obtain contacts in production lots, for experimental use, and for pilot runs or job orders.

The 70 different contacts that Mallory carries in stock—ready for immediate shipment—represent the types and sizes most commonly used in thousands of existing applications. Included are both flat and radius-faced designs.

For the new equipment you may be designing, it will pay you to use Mallory standard rivets as a "preferred list" that will assure you prompt delivery when you go into either pilot or full-scale production. It will pay you, too, to check through this standard list for sizes applicable to the equipment which you are now manufacturing. You will probably find a standard size that is readily applicable to a contact you may now be ordering on a special basis.

Our new folder 3-13A lists complete dimensions, part numbers and prices of Mallory standard stock silver rivet contacts. Write for your copy today.

FOR UNUSUAL REQUIREMENTS

When design requirements call for a contact not included in the standard stock program, Mallory engineers will be glad to lend expert assistance in recommending special designs . . . and to manufacture contacts or complete contact assemblies in our efficient production facilities.

Serving Industry with These Products:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

Expect more . . .

Get more from P. R. MALLORY & CO. INC. MALLORY

P. R. MALLORY & CO. Inc.
MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

Lab-tested thermocouple wire available through your



CONNECT a thermocouple with only $\pm 1\%$ accuracy to an instrument with accuracy of $\pm \frac{1}{4}\%$. . . and how closely can you measure? The answer is simple. Overall accuracy *can't* be any better than your thermocouple.

To guarantee you consistent accuracy in your temperature detecting elements, Honeywell maintains a fully equipped wire checking laboratory. Here every spool of thermocouple or extension wire is tested against standard wires that have

been certified by the National Bureau of Standards. Checks are made at numerous points throughout the temperature range of the calibration in which the wire will be used. Every spool of wire meets rigid standards before it is accepted. Calibration figures are tagged on each spool. The result of this laboratory control is that every order of Brown thermocouple or extension wire you receive can be counted on to deliver identical standards of high precision.

Ask your Honeywell Supplies Man

to give you complete facts about Brown thermocouple and extension wires . . . and to tell you how the HSM Plan can bring you new convenience and economy in all your purchasing of pyrometer supplies. Call him today at your local Honeywell office . . . as near to you as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR Co., Industrial Division, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● REFERENCE DATA:

Write for Pyrometer Supplies Buyers' Guide No. 100-B.



MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS

First in Controls

BIGGEST



All of the world's "biggest" tractors depend on MECHANICS Roller Bearing UNIVERSAL JOINTS to compensate for heavy-duty shocks and strains — severe enough to twist tractor frames. MECHANICS key-drive strength, flexibility and balance are unanimously specified by the largest tractor manufacturers to keep huge capacity machines operating long hours, day-after-day. They

can't afford to permit large tractors and equipment to be kept idle by needless down-time. Let MECHANICS engineers help build reliability into your (200 to 50,000 foot pounds torque capacity) machines.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2024 Harrison Ave., Rockford, Ill.

MECHANICS

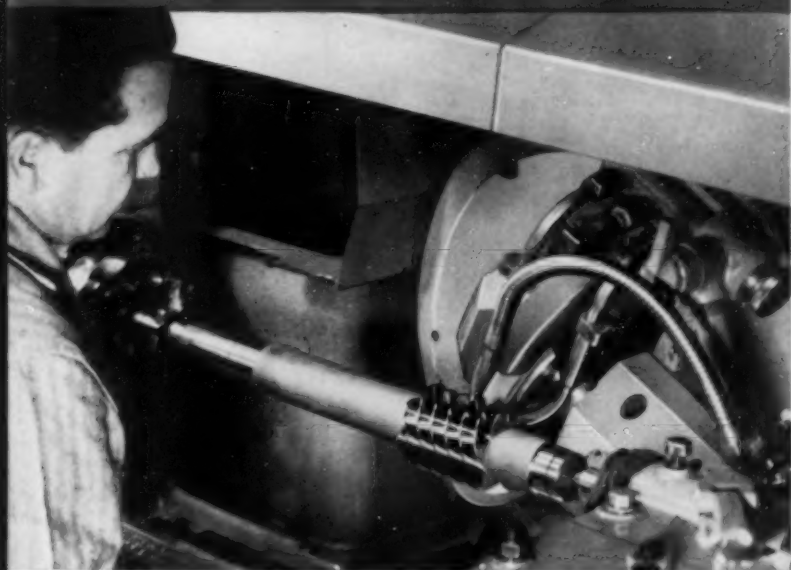
Roller Bearing 

UNIVERSAL JOINTS

For Cars • Trucks • Tractors • Farm Implements • Road Machinery •
Aircraft • Tanks • Busses and Industrial Equipment

Grinding 5-Start Worm with 4" Lead

STANDARD STYLE 36 EX-CELL-O Precision THREAD GRINDER



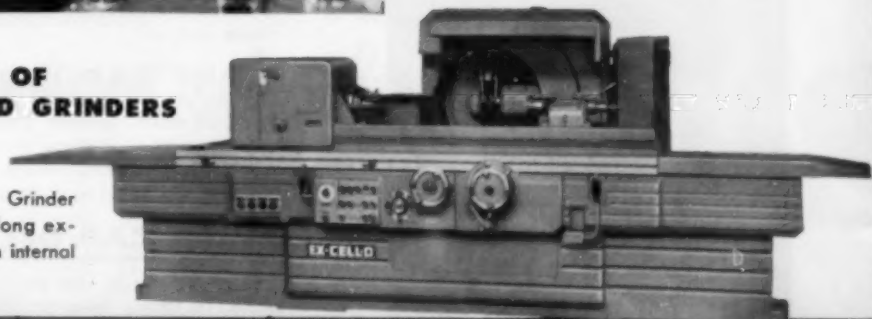
In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.



A COMPLETE LINE OF PRECISION THREAD GRINDERS

STYLE 36 Precision Thread Grinder
—a versatile machine for long external threads, available with internal attachment.



STYLE 30
Precision Thread Grinder—
a versatile machine for external work, also available with internal attachment.

STYLE 38
Precision Thread Grinder—a high production machine for external work.

STYLE 39-A
Precision Thread Grinder—a high production machine for internal threads.

STYLE 120
Our largest Thread Grinder. Grinds 10 feet of thread in one setting. Accommodates 12 feet of stock between centers.

EX-CELL-O CORPORATION • Detroit 32, Michigan

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



FOR AVOIDING HEADACHES
send your blue prints
 to **FERRY CAP**

and benefit by...

1 FERRY CAP KNOW-HOW

For nearly fifty years we have been making quality fasteners for quality products. We have a department for designing and making our own tools and dies. Our long experience in producing thousands of different kinds of special fasteners—satisfying customers the world over—is available to you.

2 FERRY CAP ENGINEERING

Our capable, experienced engineers and metallurgists are ready to assist you. These men are accustomed to solving difficult problems. Why not discuss your needs with us?

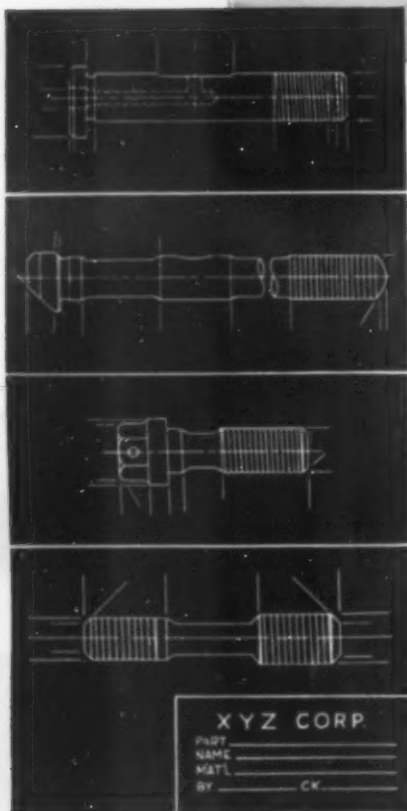
3 FERRY CAP INSPECTION

Our inspection system providing careful, thorough inspection at each stage of manufacture as well as of the finished product insures special fasteners conforming in every detail to customers' specifications.

4 FERRY CAP DELIVERY

Our raw material and production scheduling is designed for timely, mass production of special fasteners to meet customers' delivery requirements.

Full information and quotation on top quality, competitively priced, special fasteners will go forward to you promptly upon receipt of your blueprints.



The FERRY CAP & SET SCREW CO.

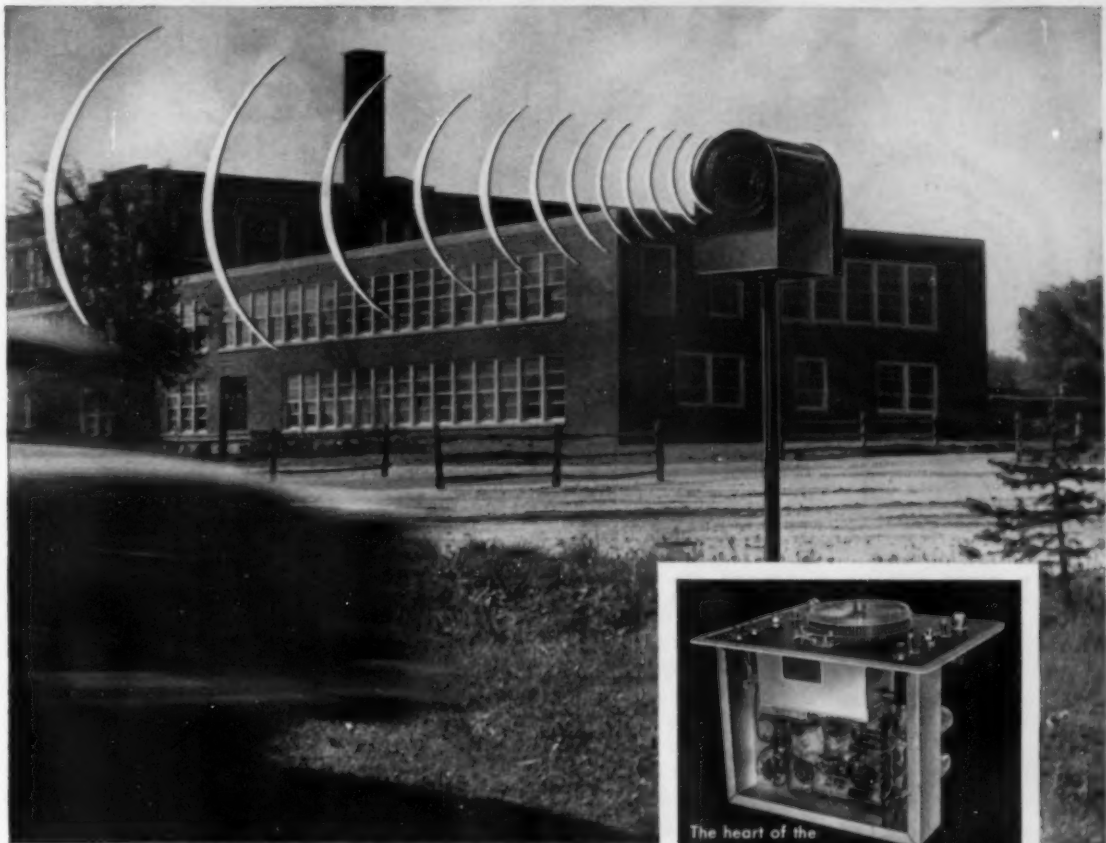
Pioneers and recognized specialists in cold upset screw products since 1907

2191 SCRANTON ROAD • CLEVELAND 13, OHIO

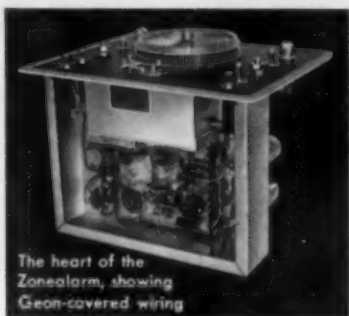
AUTOMOTIVE INDUSTRIES, October 1, 1955

Another new development using

B. F. Goodrich Chemical raw materials



B. F. Goodrich Chemical Company does not manufacture this traffic alarm; we supply only the Geon polyvinyl material for the wiring.



The heart of the Zonealarm, showing Geon-covered wiring

It Hoots at school speeders

DRIVERS who ignore signs calling for reduced speeds in school zones are in for a surprise when they meet up with Zonealarm.

It looks as innocent as a rural mailbox, but inside there is an ingenious maze of electronic devices and Geon insulated wiring that add up to trouble for speeders. If the driver ignores a warning sign, Zonealarm gives out with an ear-splitting howl. Police will tell you that where it is installed everybody slows down.

Zonealarm is a permanent installa-

tion and the mechanism must stand up in all kinds of weather and this calls for cable insulated with Geon. The remarkable dielectric strength of Geon polyvinyl materials, plus their outstanding resistance to abrasion, chemicals, and extremes of temperature, make them favored throughout industry.

Geon is used for colorful, decorative upholstery, for resilient sponge, waterproof coatings, corrosion-proof pipe, and a myriad of other products. To see how it can improve one of your

own products, or help you develop a new one, please write Dept. CA-5, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

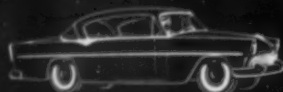


GEON RESINS • GOOD-RITE PLASTICIZERS... the ideal team to make products easier, better and more saleable.

GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors

EATON

Zero-Lash



HYDRAULIC VALVE LIFTERS

Provide Important Advantages

- ★ Silent valve train operation
- ★ Longer life for valves and seats
- ★ Elimination of lash worries for the life of the engine
- ★ Improved idling
- ★ Permit cam design for optimum engine operating efficiency at all speeds and all operating temperatures



Eaton Hydraulic Valve Lifters are available in all designs and face materials to meet the specific requirements of each application. Let our engineers work with yours.

EATON

—SAGINAW DIVISION—
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN
General Offices: CLEVELAND, OHIO



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Young Heat Transfer News

YOUNG RADIATOR COMPANY, RACINE, WIS.

Oliver Tractors with Young Radiators Stay Cool Under Full Lugging Power



**BILLY
BTU
SAYS:**

"You Just Can't Beat Radiators for Engine Cooling . . ."

Like a chameleon, Radiators are ready for just about any climate or condition you can imagine. They'll keep stationary or mobile engines cool in the Belgian Congo . . . or do a whale of a job at Little America.

Take a look at all the tools Radiators use to do a real cooling job . . . baffles, by-passes, thermostats, pressure caps, coolants. Then, there are fans, pumps and proven core designs . . . and engineering experience.

Radiator cooling eliminates needless troubles. It does away with engine hot spots, excessive oil consumption, carbon deposits, burned valves and valve seats, stuck pistons and other engine failures experienced with other types of cooling systems.

Don't be misled by the claims of other types of engine cooling systems. Remember, only Radiators can provide efficient engine cooling under every type of climate or condition.

ENGINEERING SERVICE FOR SPECIAL DESIGN APPLICATIONS

If you have a particular heat transfer problem involving any kind of agricultural equipment cooling, call or write Contract Products Division, Young Radiator Company, Racine, Wisconsin. Our Company has specialized in heat transfer engineering, product development and manufacturing for over a quarter of a century. Save your time and money . . . Write Dept. 105-K today.

Young Drawn Tank Radiators Maintain Optimum Engine Temperatures for Long Life

Oliver Corporation, Chicago, specifies rugged Young drawn tank Radiators on its Models Super 55, Super 66, Super 77 tractors.

These dependable Young Agricultural Radiators maintain optimum engine temperatures for longer tractor life. The models 55, 66 and 77 tractors are equipped with centrifugal-type water pumps, by-pass thermostats, and wet-type cylinder sleeves. Fan and water pump are located on the same shaft, maintaining air flow and water circulation in constantly equal proportion.

The Young Radiators feature full soldered, double lockseam tubes which furnish a rugged backbone to the core and extra strength to the entire Radiator. Top and bottom tanks are die-formed, bead-reinforced one-piece construction. Fabricated inlet and outlet with maximum flow area provide minimum resistance to coolant circulation.

Young Radiator Company also specializes in building engine cool-



Oliver Super 55 with baler.



Young drawn tank Radiator built for Oliver Tractors.

ing Radiators for automotive, industrial, construction, transportation and special design applications. For further details write or call Young Radiator Company, Dept. 105-K, Racine, Wisconsin.

Young

RADIATOR COMPANY

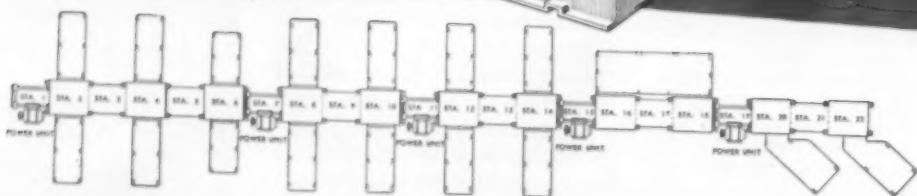
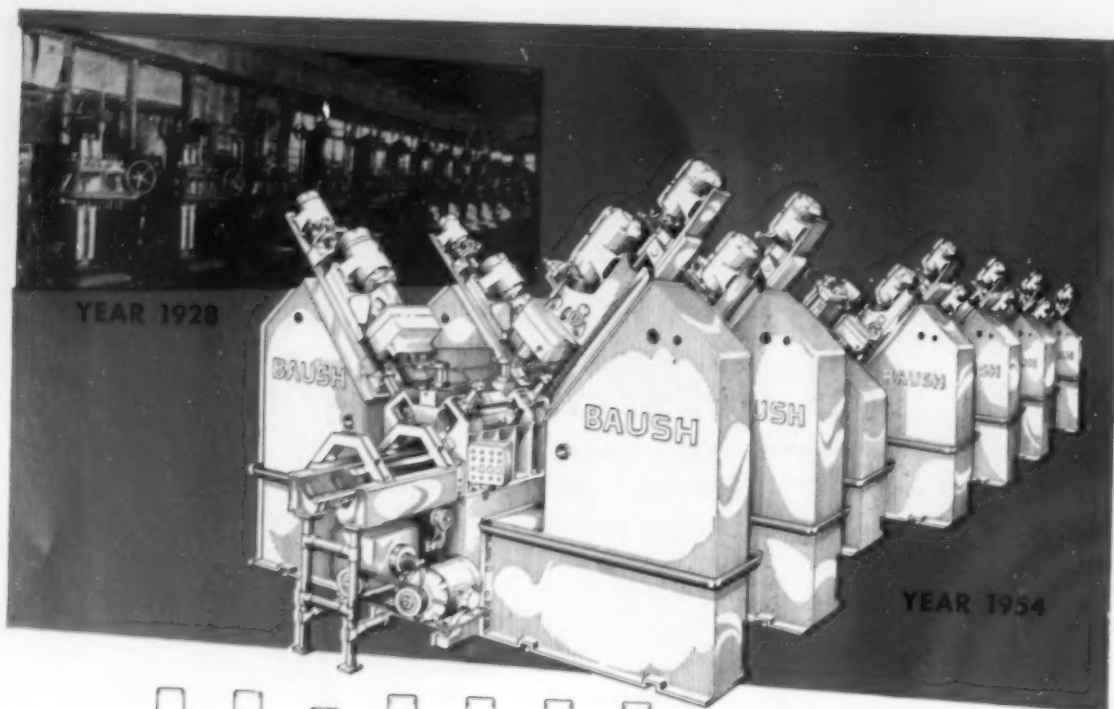
RACINE, WISCONSIN

Creative

HEAT TRANSFER ENGINEERS FOR INDUSTRY

Heat Transfer Products for Automotive, Heating, Cooling, Air Conditioning Products for Home and Industry.

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Moline, Illinois



EXCLUSIVE BAUSH TRANSFER FEATURES. Either mechanical or hydraulic

1. Individuality of each machine.
2. Accurate leveling of one machine to another not important.
3. Each machine has individual electrical panel. Simple as way-type machine.
4. One or more machines can be added to line if more operations are desired.
5. Line can be broken and automatic index, shodding, or roll-over fixtures added.
6. Give maximum production with minimum maintenance.
7. Readily adapted to automation.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

BAUSH

TRANSFER MACHINE

completes 12,600 operations per hour to

MINIMIZE . . . Labor Costs

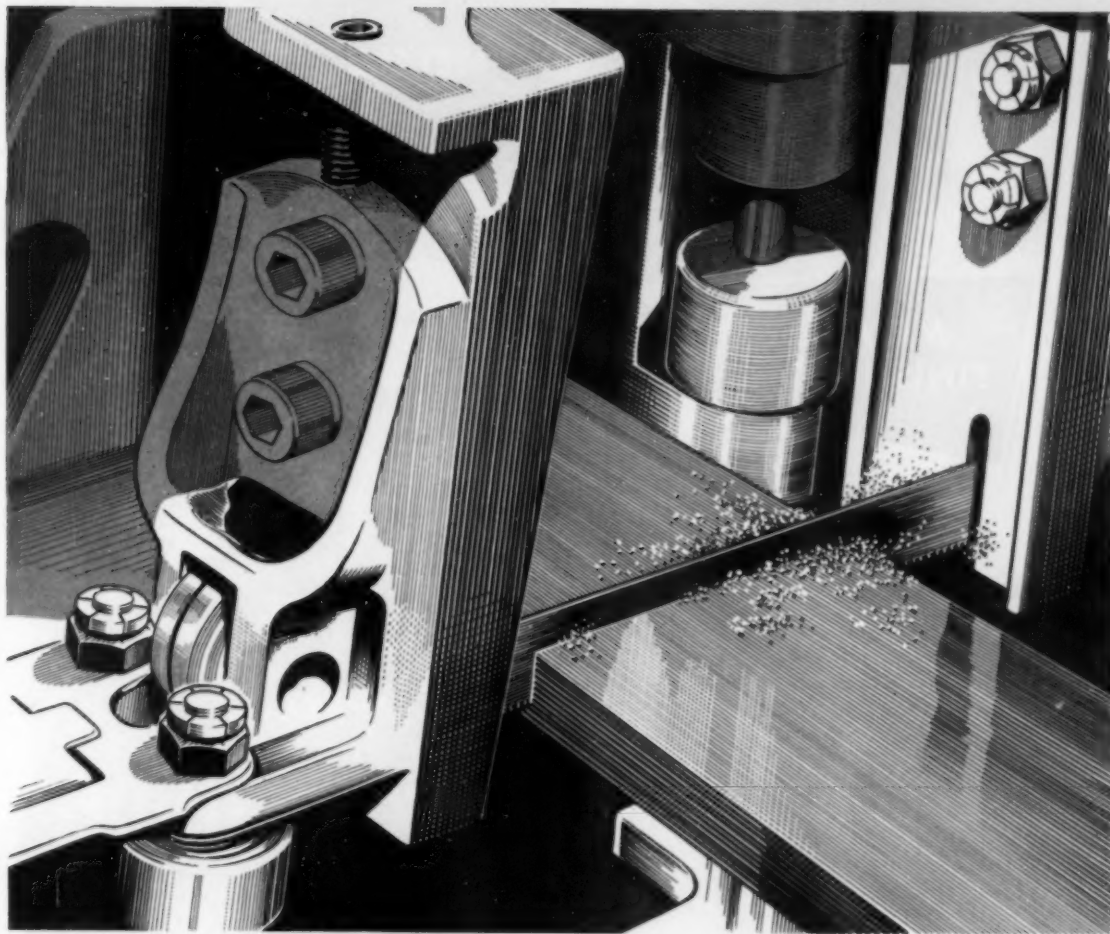
MAXIMIZE . . . Production

This 22-station automatic transfer — designed for specific operations on a new V-8 engine — is another example of Baush ingenuity and "know-how" in machine tool construction.

Transfer consists of 22 stations with 5 complete machine sections with 14 Model "S" Leadscrew Units and 2 Hydraulic Units.

There are five 4-position Transfer Sections with each fixture and bushing plates — 2 checking fixtures — power units for transfer — hydraulic locating and clamping of part and 18 Fixed Center Ball Bearing Heads having a total of 105 spindles to complete 12,600 operations to drill, core-drill, chamfer and ream 120 cylinder blocks per hour.

FLEXLOC AT WORK



Power Hack Saw Builder Fastens blade guides with FLEXLOC self-locking nuts. Eight of these one-piece, all-metal locknuts are used in this assembly. And they won't work loose, regardless of vibration.

You can get the same dependable service. FLEXLOCs come in a wide range of sizes, types and materials. They are stocked by leading industrial distributors everywhere. Ask your local man for Bulletin 866. Or write STANDARD PRESSED STEEL CO., Jenkintown 53, Pa.

• • •

Use FLEXLOCs anywhere:

ON ROUGH BOLTS. FLEXLOCs smooth out bolt threads without damaging their own threads.

IN TEMPERATURES TO 550° F. in plated nuts and even higher in unplated ones. High temperatures do not affect FLEXLOCs. Nuts with non-metallic inserts fail under such conditions.

AS LOCK OR STOP NUTS. After at least 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC stays put.

REGARDLESS OF MOISTURE, OIL, DIRT AND GRIT. Even conditions like these do not affect the locking ability of FLEXLOCs.



FLEXLOC
LOCKNUT DIVISION

SPS
JENKINTOWN PENNSYLVANIA

**HEAT
TREATING**

METALS

**METAL
FINISHING**

Your's for the looking!

*The one place in metalworking where
you'll find the answers to what's*
**NEW . . . IMPROVED . . . COST-CUTTING
. . . PRODUCTION BOOSTING!**

400-Plus Exhibits

The great names in American industry . . . displaying new and improved products . . . processes . . . services!

Over 100 Technical Sessions!

Top interest sessions will help you do a better job of producing more at lowered costs!

● Industry's concentration of knowledge and experience in metalworking . . . will be on parade for you and your management, engineering, production and purchasing associates to see at Philadelphia Metal Show! Whatever your needs . . . from metals engineering to metal finishing . . . from design to testing and inspection . . . you'll find the quick, sure answers at the technical sessions of the Metal Congress . . . at the operating exhibits of the Metal Exposition. Don't miss it!

National Metal Exposition and Congress...

**CONVENTION HALLS
PHILADELPHIA, PA.**

**OCTOBER
17 thru 21
1955**



**OWNED AND MANAGED BY THE
AMERICAN SOCIETY FOR METALS
7301 EUCLID AVE., CLEVELAND 3, OHIO
PUBLISHERS OF: Metal Progress,
Metals Review, Metals Handbook, Transactions**



"excellent finish"



SURVEY

DESCRIPTION OF WORK

Surface grinding tool bits
to size on production basis.

SEGMENTS

Simonds Abrasive Company NA 36-G9-B3

PERFORMANCE

Excellent finish, plus long segment life.
Performance unequalled by other
makes of segments over many years.

SIMONDS
ABRASIVE CO.

abrasive segments

Send for catalog bulletin "Abrasive Segments" form ESA-100

Superior results plus long productive use! This is the constantly recurring theme of surveys covering jobs on which Simonds Segments are used. You'll find them equally productive and durable on your jobs.

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y.,
Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and
Simonds Canada Abrasive Co., Ltd., Arvida, Quebec



Bendix Products Division

A GOOD RELIABLE SOURCE FOR AUTOMOTIVE COMPONENTS



TYPICAL EXAMPLES



BENDIX LINKAGE TYPE POWER STEERING—Because Bendix* Power Steering is of the linkage type, manufacturers find it especially adaptable for production line installation without extensive engineering changes. Manufacturers can now meet the ever-increasing demand for power steering more efficiently and more economically with Bendix Linkage Type Power Steering.

BENDIX LOW PEDAL POWER BRAKE—Specified by more car manufacturers than any other make, Bendix* Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from the go to the stop control. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety.

*REG. U. S. PAT. OFF.

BRAKES • POWER STEERING • POWER BRAKING • CONSTANT VELOCITY UNIVERSAL JOINTS • HYDRAULIC REMOTE CONTROLS

BENDIX PRODUCTS SOUTH BEND INDIANA
DIVISION

Export Sales: Bendix International Division, 208 East 42nd Street, New York 17, N. Y.

Bendix
AVIATION CORPORATION

AUTOMOTIVE INDUSTRIES

BUSINESS DEPARTMENT

John C. Hildreth, Jr., Publisher
John F. Pfeffer, Asst. to Publisher
E. H. Miller, Advertising Mgr.
E. W. Haver, Circulation Mgr.
John R. Flood, Market Research
Chestnut and 56th Sts.
Philadelphia 39, Pa.
Phone SHerwood 8-2000

REGIONAL MANAGERS

CHICAGO—John T. Hoole
916 London Guarantee
and Accident Building
Chicago 1, Ill.
Phone FRanklin 2-4243

DETROIT—Melvin B. Nylund
1015 Stephenson Bldg.
Detroit 2, Mich.
Phone TRinity 5-2090

PHILADELPHIA AND NEW YORK—
Nelson W. Sieber
Chestnut and 56th Sts.
Philadelphia 39, Pa.
Phone SHerwood 8-2000
and
100 East 42nd St.
New York 17, N. Y.
Phone OXford 7-3400

CLEVELAND—Richard P. Keine
730 National City Bank Bldg.
Cleveland 14, Ohio
Phone CHerry 1-1188

SAN FRANCISCO—
R. J. Birch and Frank W. McKenzie
300 Montgomery St.
San Francisco 4, Calif.
Phone DOuglas 2-4393

LOS ANGELES—L. H. Jackson
3156 Wilshire Blvd.
Los Angeles 5, Calif.
Phone DUmkirk 7-2119

One of the Publications
Owned by

① CHILTON CO. (INC.) ①

Executive Offices
Chestnut & 56th Sts.
Philadelphia 39, Pa., U.S.A.

Officers and Directors

JOSEPH S. HILDRETH, Chairman of the Board

G. C. BUZZY, President

Vice Presidents

F. M. FAHRENDORF

HARRY V. DUFFY

Treasurer—WILLIAM H. VALLAR

Secretary—JOHN BLAIR MOFFETT

GEORGE T. HOOK

MAURICE E. COX

FRANK P. TIGHE

L. V. ROWLANDS

ROBERT E. McKENNA

IRVING E. HAND

EVERETT B. TERHUNE, JR.

JOHN C. HILDRETH, JR.

RUSSELL W. CASE, JR.

High Spots of This Issue

★ New Jets and Airliners at Farnborough Exhibition

The British aircraft industry put its best foot forward at the recent Farnborough Air Show with a flying display of 40 different machines and a total of 307 exhibitors. Included in the former were several new developments. Page 48.

★ Intense Activity in Fuel Injection Research

Currently a "hot" subject in the industry, there is much talk of fuel injection equipment for new V-8 car engines. This article is devoted to present engineering research on the topic as conducted by several major firms. Page 54.

★ Features of Mercury Car Line for 1956

A 12-volt electrical system and a 312 cu in. basic engine, available with three different compression ratios, headline mechanical features found in the 1956 Mercury. Other basic changes are also described here. See Page 58.

★ Many Modern Machine Tools Seen at Chicago Show

The NMTBA Exposition last month was most gratifying to the management, exhibitors, and visitors alike from every viewpoint with record sales and attendance figures. This is a review of a show that will be long remembered. Page 60.

★ All Types of Equipment Amassed at Aircraft Show

Over \$1 billion worth of equipment of many varieties for both military and civilian applications was displayed at the recent National Aircraft Show. Selected items are described and illustrated in this account. See Page 68.

★ 44 New Product Items

And Other High Spots, Such As:

SAE tractor meeting; new car heater; new International trucks; 1956 Fords; aircraft ignition conference; 1956 Ford truck engines; and spray coating process.

Complete Table of Contents, Page 3
Automobile and Aviation News, Page 33

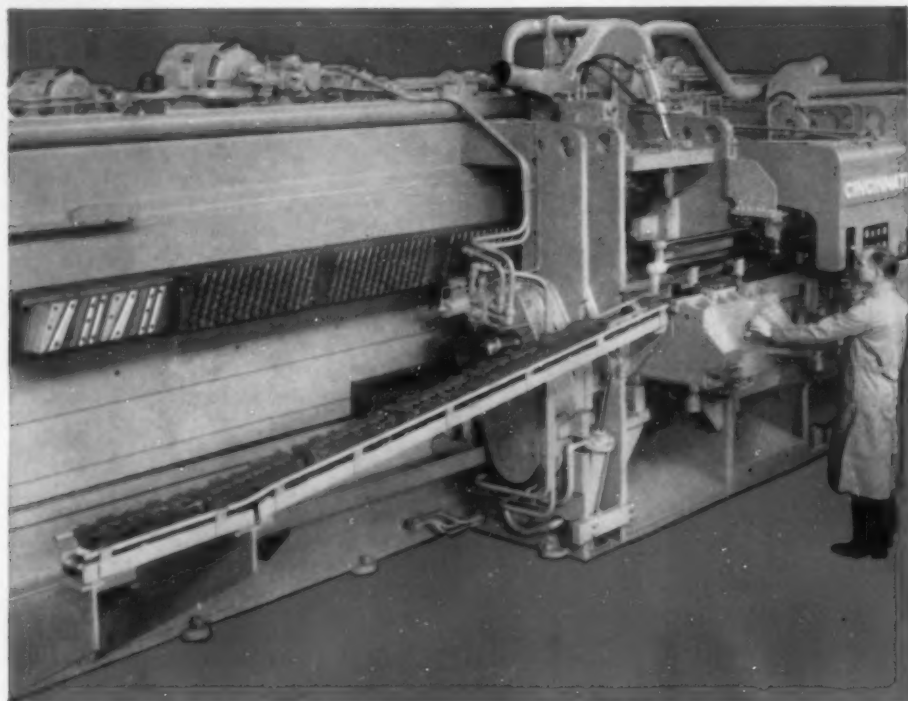
AUTOMOTIVE INDUSTRIES COVERS—
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

BROACH

Double - Action Cincinnati

BROACH

Broaches 150 Cylinder Heads per Hour



Within the past few years spectacular progress has been made in the design and cost-reducing potential of machine tools. For example, consider the cost savings now possible in the machining of cylinder blocks and heads.

Today, CINCINNATI Horizontal High Speed Surface Broaching Machines are producing $2\frac{1}{2}$ times faster than comparable equipment a few years old, and tool life per unit has increased 25 times!

While these cost savings are more spectacular than might be realized in the production of smaller parts, they are indicative of the big strides made by Cincinnati Milling in reducing costs through the application of modern broaching techniques. Remember this: Cincinnati's broaching experience dates back more than 20 years . . . Cincinnati was first in developing many present-day broaching concepts such as electro-mechanical drive . . . Cincinnati builds a complete line of horizontal and vertical broaching machines, including large special broaches built to your specifications. Would you like to have a picture-book review and brief specifications of CINCINNATI Horizontal Broaching Machines? Write for catalog No. M-1910.

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

PRODUCTION DATA

Surfaces broached	top, joint, intake and exhaust faces
Cutting speed	150 feet per minute
Stock removal	3/16" (1/2 ton per hour)
Production	150 heads per hour



CINCINNATI 22-foot stroke, Two-Way Horizontal Broaching Machine, tooled up and conveyerized to broach cylinder heads.

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 113, No. 7

October 1, 1955

Chevrolet To Offer Harness In Addition To Seat Belts

Chevrolet is the first General Motors division to announce seat belts on 1956 cars. GM has reportedly been skeptical about the value of safety belts, but it apparently will go along with the rest of the industry in making them available.

In addition to seat belts, Chevrolet will offer shoulder harnesses as optional dealer-installed equipment. Both Chrysler and Ford are offering seat belts, but neither apparently plans to offer shoulder harnesses at the moment.

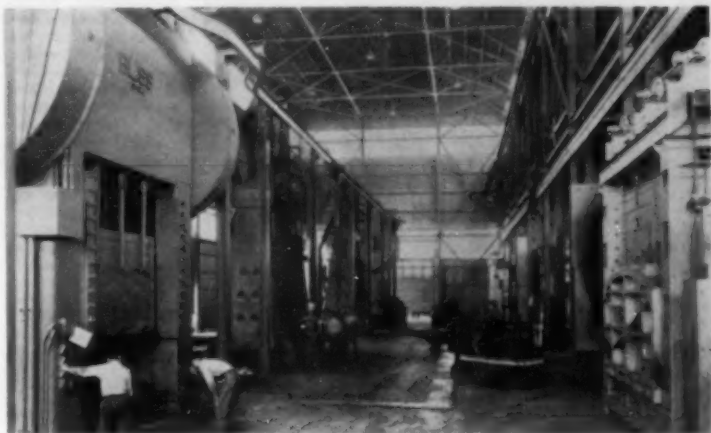
U. S. Orders 5000 Trucks From Ford, General Motors

Defense contracts totaling more than \$8.5 million have been awarded to GMC Truck & Coach Div. and Ford. GMC's award calls for \$5.66 million worth of 2½-ton stake and platform trucks, while Ford's is for \$3 million of similar type 1½-ton trucks. Each order is for 2500 trucks.

Chrysler's Long-Range Program Includes New Assembly Plants

Chrysler Corp. has formulated a master plan of expansion under which it will build at least seven new assembly plants within the next 10 years. Although the corporation gave no further details of the plan, it is understood that most of the new plants will be located outside of Michigan. The move is certainly one of the most significant ones in the history of the corporation, which this year set its sights on new goals in an increasingly competitive era in the automobile industry.

Where the "regional" plants will be located is not yet known, but it is highly probable that some of them will be built in expanding market areas, where both GM and Ford have



KROPP FORGE CO. DISPLAYS EFFICIENT HAMMER SHOP

Kropp Forge Co. recently unveiled its new hammer shop which houses two Erie 50,000-lb drop forge hammers and six Lithium atmospheric controlled furnaces. Also installed in the new facility are two 2750-ton Bliss presses, a large hydraulic forging press, and other auxiliary equipment for the production of large and complex forgings.

final assembly operations. Chrysler has only two automobile assembly plants located outside of Michigan—the Plymouth plant in Evansville, Ind., and one in Los Angeles, which builds all five Chrysler-made cars.

Ford has 17 final assembly plants located outside of Michigan, while GM has 16. About 85 per cent of Chrysler's manufacturing operations at present are located in the Detroit area, although the corporation makes parts for cars at 16 plants outside of the Detroit area.

The new program, still in the tentative stage, also will include further expansion and modernization of Chrysler's Detroit plants. It should bring the corporation's total expansion outlay since the end of the war to more than \$1 billion.

Chrysler's postwar expansion plans have totaled more than \$730 million. Expansion programs announced so far this year alone total more than \$160 million.

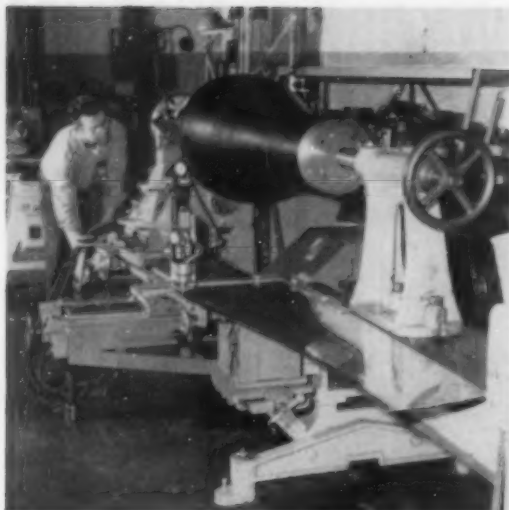
Borg-Warner Corp. Building New Research Center in Ill.

A multi-million dollar research center, consisting of a series of one-story buildings with each designed to house different activities, is being constructed by Borg-Warner Corp. in Des Plaines, Ill. The first building to be completed will contain about 40,000 sq ft of floor space and form the central unit about which the entire laboratory will be built.

When completed, the new unit will replace the company's smaller research laboratory located in Bellwood, Ill. To be situated on a 36½-acre site, the new center will contain research facilities ranging from physics and nuclear research to a modern computation center and technical reference library.

In addition, there will be an advanced engineering and design section which will work on long-range product development.

News of the AUTOMOTIVE



TRACER UNIT

Unique tracer unit, developed by Douglas Aircraft Co., Inc., is now in use in the Sheet Metal and Extrusions Dept. at the El Segundo Div. It is said to duplicate on a round section the configuration of a flat pattern in a remarkably short time. Conventional lathe carbide tip cutter is actuated by a True Trace hydraulic valve from responses received as stylus moves along the edge of the template. Tolerances of $\pm .005$ of an inch are reportedly achieved by this method. A transit, mounted on the head stock, is used to set the center line of the template accurately.

AMC Closes Its Calif. Plant; Expands Wisconsin Facilities

American Motors has closed out its El Segundo, Calif., assembly plant and will concentrate all production in its Wisconsin plants. The move is seen as another step in the company's cost reduction program.

New and additional assembly lines and manufacturing facilities at Kenosha, Wis., have been completed and were scheduled to begin producing cars on Oct. 1. Production of Ramblers reportedly will be increased 60 per cent by the new facilities.

Total capacity for passenger cars at the Milwaukee and Kenosha plants is currently 1800 units a day. About eight per cent of the company's total automobile production had been turned out at the El Segundo plant, which will be sold.

Square D Reports Shipments Running At All-Time Height

Since its newest plant in Cedar Rapids, Iowa, is expected to be in full operation by the end of the year, Square D Co. expects sales for 1955 to exceed last year's volume of \$56 million. Shipments by the company's four U. S. divisions were at record levels during the third quarter.

A two-day civic program marking completion of the new Cedar Rapids plant was held by the company last month (Sept.). Located on a 54-acre site, the 112,000 sq ft unit will employ upwards of 500 workers when in full operation. It manufactures circuit breakers, automation components, and other electrical devices.

Optimism Prevails For '56 Car Market

With 1955 already assured as a record year for the automobile industry, predictions are now being written for next year. Basing their forecasts on the premise that there seldom have been two unusually big years for car production in a row, some industry observers look for a moderate decline in 1956. However, if a continued growth in consumer spending takes place, all these forecasts could be upset, as were those made for 1955 in the early part of the year.

Although automobile company executives believe the high level of public demand for new cars will continue, most do not expect it to equal this year's market. One reason is that the new models will be changed little; major innovations made on 1955 cars were one of the chief factors affecting record sales and production.

Chrysler Claims Record For Number Of Races Won

When a Chrysler 300 crossed the finish mark at the Milwaukee stock car race on August 25, it marked the 28th top U. S. stock car race won by Chrysler Div. cars in 100-mile-plus contests. The division claims that this is nearly three times the number of races won by any other U. S. automobile which has been sanctioned by AAA and NASCAR.

Ford Increases Its 1956 Prices From \$46 to \$99; Equipment Cut

Price increases ranging from 2.39 to 6.69 per cent, or from \$46 to \$99 a car, have been announced by Ford Div. of Ford Motor Co. for its 1956 models. The largest price increases are to be found in the Mainline series, while the smallest changes appear in the more costly Fairlane models.

Attributed to general higher manufacturing costs, the price increases are said to average out to less than five per cent above comparable 1955 models. The company stated that in some cases the higher prices would be partially offset by reductions in the cost of certain optional equipment. For example, power steering was cut to \$49.50 from \$85 on 1955 models, while a six-tube radio for 1956 is listed at \$71.20 against \$81.30.

FORD PRICES*

Mainline Series	1955	1956
Business Sedan	\$1,562	\$1,464
Two-Door Sedan	1,467	1,558
Four-Door Sedan	1,699	1,601
Customline Series		
Two-Door Sedan	1,742	1,645
Four-Door Sedan	1,785	1,686
Fairlane Series		
Two-Door Sedan	1,829	1,750
Four-Door Sedan	1,871	1,793
Victoria Two-Door	1,945	1,919
Crown Victoria	2,099	2,019
Sunliner	2,119	2,029
Station Wagon Series		
Ranch Wagon	1,956	1,870
Custom Ranch Wagon	2,016	1,931
Country Sedan (six pass.)	2,060	1,976
Country Sed. (eight pass.)	2,183	2,095
Parklane	2,183	2,136
Country Squire	2,280	2,196

*Suggested list charges at Dearborn, Mich., on six-cylinder Fords for 1956, compared with 1955 models; add \$35 for V-8 models. Prices do not include dealer charges, Federal excise, state, and local taxes, license fees, or optional equipment and accessories.

AND AVIATION INDUSTRIES

Wiles Sees Eight Million Car Sales This Year; Same in 1956

Most optimistic forecast yet on automobile sales this year comes from Ivan L. Wiles, vice-president of General Motors and general manager of Buick. Speaking at a press showing of 1956 models on Sept. 21, he said that industry sales this year will total eight million cars and should reach that number or more in 1956.

Mr. Wiles did not indicate whether the sales prediction of eight million units included exports. According to best estimates available, these will run between 250,000 and 300,000 units this year.

Buick will build about 800,000 cars in 1955, Mr. Wiles went on to say. In view of its expanded production facilities, the division's goal is 900,000 cars in 1956 and one million in 1957. He also revealed that Buick's market penetration has increased to 10.7 per cent and that it aims on increasing this percentage next year.

It was obvious from the stress laid on the Special line at the press preview that Buick is counting on its lowest-priced series to play a major role in its ambitious sales program for the years to come. By way of an interesting sidelight, Mr. Wiles predicted that the four-door hardtop sedan may eventually push the conventional four-door sedan out of a prominent place in the sales picture. To support his contention, he quoted figures to show that about 65 per cent of Buick's total production was in two and four-door hardtops.

Ford of Canada Shows Its 1956 Meteor Cars

A new low roof line, longer, lower body lines, and a V-sweep grille are some of the distinguishing new style changes to be seen on the 1956 Meteors. The cars were displayed to the public across Canada on Sept. 30 by Ford Motor Co. of Canada, Ltd.

The new line of Meteors have a new overhead valve V-8 engine, chassis improvements, and safety features. The cars will be built in four series—Rideau, Station Wagon, Niagara, and Meteor—with 14 body styles.

TURBO-CHARGED DIESEL UNIT

This new Cummins 250-hp turbocharged NT-6 Diesel engine is now available for automotive, off-highway, industrial, and marine applications. The six-cylinder, four-stroke power plant has a bore and stroke of 5 1/8 in. and six in. and a piston displacement of 743 cu in. Compression ratio is 15.5 to 1, weight is 2546 lb., and maximum speed is 2100 rpm.



Mercedes-Benz Plans In Brazil Go Ahead

Some time ago the Brazilian Finance Minister authorized Mercedes-Benz of Brazil to import into the country all necessary equipment and machinery for the manufacture of automobile engines there. It is understood that the first shipment will soon leave Germany.

It is generally known that Mercedes-Benz plans to manufacture approximately 500 to 600 trucks and 200 to 300 passenger cars per month.

Cadillac To Boost Output By 4000 Units In 1956

Cadillac has revised its car production figure for 1955 and at the same time raised its sights on a higher goal for 1956. During a press preview of the 1956 cars, James M. Roche, general sales manager, said the division will boost next year's production by 4000 units to 156,000.

Last year, the division forecast that it would build a new high of 150,000 cars in 1955. Its latest estimate is for production of more than 152,000 units, well over 25,000 units more than during 1954.

Cadillac will offer 10 body styles in three series for 1956. Included will be a two-door hardtop called the Eldo-

rado Seville and a four-door hardtop, the de Ville.

In addition, the company sometime next year will put into production the custom Eldorado Brougham. Expected to sell for about \$8,500, it will be a four-door hardtop without center pillar. Incorporated will be four pivoting seats and special sill latches to keep the doors locked while the car is in gear.

Displacement and output of Cadillac's V-8, overhead valve engine has been increased to 265 cu in. and 285 hp for 1956, up 35 hp over the 1955 model. When installed in the Cadillac Eldorado, the engine develops 305 hp. Compression ratio of the engine has been boosted to 9.75 to 1.

The new smoother Hydra-Matic transmission, on which GM spent \$35 million for tooling, together with the increased horsepower improve acceleration between zero and 60 mph a total of 10.1 seconds. Other refinements on the 1956 Cadillac line include new front and rear fenders and bumpers, new hood and grille and instrument panel.

Cadillac has invested about \$29 million in tooling for the 1956 models. As other car makers, Cadillac will offer safety seat belts for 1956 as an extra cost item. A padded instrument panel, which Cadillac has had for some time, also will be featured on the 1956 line.

News of the AUTOMOTIVE



SELF-LOADER

This industrial truck loading itself with 40-ft lengths of 30-in. pipe is a Baker-Rawlong Traveloader. It can pick up or deposit loads at ground level or stacks up to 12 ft high. Forks will retract and lower to deposit the load on the truck's flat bed.

Ford Gets U.S. Contract To Appraise Tank Program

Ford has received a one-year Government contract aimed at reducing the time needed to resume tank production in an emergency. Part of the company's new "Operation Readiness" program, the contract calls for examination by the company of the latest version of the M-48 medium tank.

Under the study, Ford will determine the number of parts which have been changed since it stopped producing the tanks in 1953 and decide whether previous production methods and equipment are adaptable to the current tank model. The tank study contract is one of three being negotiated by Ford with military agencies to determine resources required for production of specific military items. The combined contracts are worth close to \$3 million.

Nearly 900,000 Workers Covered by GAW Plan

Agreement on a new three-year contract between International Harvester Co. and the union brings to nearly 900,000 the number of UAW-CIO workers now covered by the modified guaranteed wage plan. Featuring benefits closely paralleling those incorporated in contracts signed by the Big Three car makers, the I-H pact covers about 40,000 workers in 18 plants. The com-

pany estimates the new pact will cost it about \$30 million a year.

In addition to a 26-week layoff plan, patterned after that of the automobile industry, the pact includes an 11-cent general wage increase, 11 cents in pension benefits, three cents in additional insurance coverage, 2.3 cents in special skilled trade pay boosts, and a 1.7 cents in area pay differential elimination. The total package amounts to a 34-cent average individual increase.

U. S. Rubber Co. Announces Tire With Protective Shield

A new approach to the use of steel wire in passenger car and truck tires has been developed by U. S. Rubber Co. It has announced a new line of premium tires utilizing a steel shield of very high-strength flexible Swedish steel wire mesh incorporated between the tread and the carcass of the tire.

Basic advantages claimed for the new construction are: reinforcement of the tread to protect the carcass from damage by cuts, ruptures, stone penetrations and other highway hazards; minimizing of tread separation because the bond between rubber and steel wire is stronger than the bond between textiles and rubber; a substantial reduction in groove cracking; and 30 to 40 degrees cooler operating temperature in the tire because the shield conducts heat away from the shoulders toward the cooler parts of the tire.

Another big advantage cited by U. S. for the steel shield tires is that they can be recapped more often because the shield protects the carcass from damage. Costly sectional repairs are practically eliminated, according to the company.

The new tire line is being made available in all truck sizes ranging from 6.00 through 11.00 and also is offered in the company's premium tubeless tire in all sizes for passenger cars. It is priced competitively with other premium tires at approximately the 15 to 20 per cent level above first line tires.

Lincoln Boosts 1956 Prices On Cars from \$10 to \$243

Lincoln, one of the few automobile manufacturers to hold the price line when 1955 cars were introduced, has increased prices on 1956 models by from \$10.90 to \$243.90. It is expected that other automobile companies will follow suit as a result of higher labor costs stemming from new contracts with the union.

The new suggested list prices range from \$3,735 for the Capri Coupe to \$4,318 for the Premiere Convertible, a new series. The same number of models is being offered for 1956, although the Capri Convertible and two models in the custom series have been dropped. Three models, constituting the Premiere series, have been added for a total of five models.

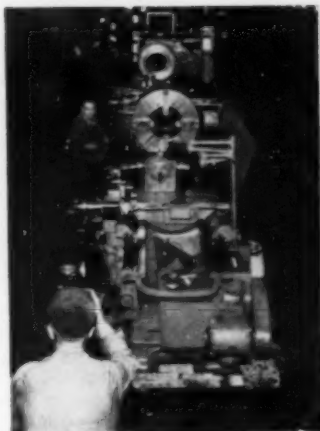
Power steering and windshield washers, optional equipment on 1955 models, will now be offered as standard on all Lincoln cars. The plush Premiere series also will include four-way power seats and window lifts as standard equipment. All-leather trim will be available on the Premiere series at no extra charge.

LINCOLN PRICES*

	1955	1956
Capri Coupe	\$3,735	\$3,734
Capri Four-Door Sedan...	3,831	2,877
Premiere Coupe	4,183
Premiere Four-Door Sedan	4,183
Premiere Convertible ...	4,318

* Suggested list prices, excluding distribution and delivery charges, preparation and conditioning charges, Federal excise taxes, state or local taxes, license fees, optional equipment, and accessories.

AND AVIATION INDUSTRIES



CANNON LINE-UP

Millwright in foreground is shown using an alignment scope to line up one of the 48-ft lathes which will be used by Oldsmobile to turn 90 mm cannon tubes. Other man in background is shown beside the target light.

Zollner Machine Works Plans Permanent Mold Aluminum Unit

Plans for immediate construction of a permanent mold aluminum foundry have been announced by Zollner Machine Works, Inc.

The foundry will be completely mechanized and is intended for a three-fold purpose: first, to improve efficiency in the manufacture of pistons in the heavy-duty truck and industrial field; second, to produce pistons competitively for passenger car accounts who purchase pistons in the form of castings; and third, to produce diversified products requiring high strength, permanent mold castings.

Hayes Manufacturing Plans To Change Name

If stockholders approve, the name of Hayes Manufacturing Corp., Grand Rapids, Mich., will be changed to United Industrial Corp. The company believes the new name will more appropriately describe its diversified activities. Stockholders will decide on the name change at a meeting October 10.

A I TABLOID A I

International Harvester Co. has added nine Diesel-powered trucks to its specialized heavy-duty line. . . . Four Wheel Drive Auto Co. has announced a new series of pumper fire engines with 226 to 240-hp engines.

U. S. Spring & Bumper Co. has changed its name to Rheem Automotive Co.

Dow Chemical Co. will erect a new plant for the manufacture of Styrofoam plastic at Torrance, Calif.

Canadian Pratt & Whitney Aircraft Co., Ltd., has announced the purchase of all machinery and equipment supplied to it by the Canadian government for the production of Wasp piston engines.

Chrysler Corp. has stated that it spent \$175 million to develop and put into production its 1956 line of cars.

Du Pont Co. has disclosed plans for a multi-million dollar addition to its new plant under construction near Antioch, Calif.

Bristol Aeroplane Co., Ltd., has transferred operations of the existing Aircraft, Engine, and Car Divisions to the control of three new subsidiary companies. . . . Johns-Manville Corp. will split its present Industrial Products Div. into the new Packings and Friction Materials, Industrial Insulations, and Pipe Divs.

Olin Mathieson Chemical Corp. has announced completion near Pittsburgh of a plant for the formulation, packaging, and distribution of automotive anti-freeze and related products.

Parish Pressed Steel Div. of Dana Corp. has announced a multi-million dollar expansion program that will increase its automotive chassis frame production capacity by 40 per cent.

Bell Aircraft Corp. now has the use of part of the former Chevrolet aviation engine plant in Tonawanda, N. Y.

Titanium is to be used extensively in the Bristol Proteus 755 turboprop engines which power long-range Bristol Britannia airliners.

Clark Equipment Co. has announced that its wholly-owned subsidiary, Canadian Clark, Ltd., will establish its first Canadian manufacturing plant at St. Thomas, Ont. . . . Houdaille-Hershey Corp. announced it is planning construction of a \$2 million plant in Huntington, W. Va., to make automobile bumpers.

Massey Machine Co. has been transferred to Curtiss-Wright Corp.

Minneapolis-Honeywell Regulator Co. has announced plans for a \$775,000 expansion of its aeronautical engineering and research facilities in Minneapolis, Minn.

Sciaky Bros., Inc., has opened two new sales and service offices at 231 Healy Bldg., Atlanta 3, Ga., and 709 Bank of America Bldg., San Diego 1, Calif.

Shareholders of Hoover Ball & Bearing Co. have approved the acquisition of the common stock of Universal Die Casting & Mfg. Co.

News of the AUTOMOTIVE



Bell X-2 rocket-powered plane for research on problems of the heat barrier.

United Press

Rocket-Powered Bell X-2 To Probe Thermal Barrier

Speeds of more than 1650 mph are expected of the new Bell rocket-powered X-2 plane. It will be tested soon by the Air Force at Edwards Air Force Base, Calif.

Designed as a flying research laboratory, the X-2 is built in considerable part of stainless steel to withstand the high temperatures of super-

sonic flight. It will collect scientific information for use in developing future combat planes.

The X-2, like the predecessor X-1A built by Bell, will be taken aloft by a mother plane, thus expending none of its power for takeoff. Its power plant is a Curtiss-Wright rocket engine.

Five-Piece Safety Package Being Offered On '56 Fords

Automobile crash demonstrations conducted by Ford last month indicate that seat belts, impact absorbing steering wheels, safety door locks, safety rear view mirrors, and padded panels may help reduce accident injuries by as much as 50 per cent. How effective the devices really are will not be known until the cars are actually on the road and mass data becomes available.

Ford is offering a five-piece safety package on its 1956 models. It will include as standard equipment a "dished in" steering wheel, safety door latches, and mirror with special backing to reduce possibility of glass falling out when shattered. Seat belts and padded instrument panel will be sold to dealers at cost and will be available as a package optional for \$25.

Active in automobile research work for some time, Ford has offered to share its safety findings with the rest of the industry. The Ford studies, carried out in cooperation with Cornell University, are based on the principle of (1) trying to keep passengers within the vehicle during an accident and (2) designing interior components to help occupants absorb the energy of the crash.

Research at Cornell has shown that 40 per cent of all drivers injured in accidents are hurt on the steering wheel assembly, while about 38 per cent of all front seat passengers incur their injuries from the instrument panel. Chances of injury are doubled when a passenger is thrown out of the car during a collision, the research studies showed.

Chevrolet To Enlarge California Body Plant

A one-story building for assembly of convertible and station wagon bodies will be added to the Chevrolet plant in Van Nuys, Calif. When completed early next year, the 93,750 sq ft plant will increase body-building space there by 30 per cent. In the past, the West Coast plant has been receiving bodies for convertibles and station wagons from plants in Ohio and Michigan.

1955 RETAIL CAR SALES BY PRICE GROUPS*

Price Group	Number of Cars				Seven Months			
	July		1954		1955		1954	
	Units†	% of Total	Units†	% of Total	Units†	% of Total	Units†	% of Total
Under \$2,000	282,081	56.47	279,479	59.23	2,274,066	54.55	1,958,790	59.78
\$2,001 to \$2,500	296,872	31.27	323,261	28.13	1,398,134	31.34	933,467	29.43
\$2,501 to \$3,500	62,396	9.71	81,290	10.67	487,086	11.21	332,427	10.76
Over \$3,500	18,381	2.55	17,798	3.77	119,764	2.67	132,129	4.63
Total	642,209	100.00	471,830	100.00	4,167,601	100.00	3,276,796	100.00

Dollar Volume of Sales

Price Group	July				Seven Months			
	1955		1954		1955		1954	
	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total
Under \$2,000	\$ 688,531,002	49.22	\$ 689,298,100	50.87	\$4,317,941,484	47.67	\$3,567,634,982	51.35
\$2,001 to \$2,500	488,716,516	33.66	552,997,086	25.25	1,946,467,156	33.23	1,904,538,228	27.46
\$2,501 to \$3,500	174,905,399	12.50	139,907,102	13.96	1,321,561,087	14.40	962,604,529	13.96
Over \$3,500	63,821,000	4.70	68,275,573	6.92	488,983,881	6.30	510,108,599	7.34
Total	\$1,386,975,797	100.00	\$1,051,298,670	100.00	\$6,174,683,208	100.00	\$6,947,106,556	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four-door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

AND AVIATION INDUSTRIES

Thompson Products Sets Up Group To Study Atom Work

As atom power continues to grow in importance, many concerns are entering the nuclear field for the first time, and others are stepping up their activities in atomic research work. Thompson Products Co. is among the latest to join in industry's attempt to unravel some of the mysteries of atomic energy.

A special group of executives is being formed at Thompson to exploit new developments in the field and to survey other companies engaged in the nuclear field. One of the functions of the new department will be to consider the possible acquisition of such concerns to expand Thompson's nuclear work.

American Airlines To Use Allison Turboprop Engines

American Airlines, Inc., has awarded Allison Div. of General Motors Corp. a \$12.5 million contract for production of Model 501 turboprop engines. The announcement thus ends speculation as to what type of engine American would use to power the Lockheed Electra commercial turboprop transport.

The Allison Model 501 turboprop engine is the commercial version of the T56 engine used by the Air Force. Under the contract, Allison will provide 104 of the engines and delivery of the first one is scheduled for use on prototype models in 1956.

Allison ordered 35 of the Electra transports from Lockheed last June. Designed to use engines rated as high as 5000 hp, the Electra is capable of speeds exceeding 400 mph.

Chrysler Backs Up Dealers With Vigorous Sales Plans

Results accomplished under Chrysler Corp.'s divisionalization program launched last year are exemplified by the Chrysler Div. Since the beginning of the year, the division has activated 20 new departments in the national sales structure, and has been conducting a vigorous sales program to assist its dealers.

During the first six months, the

BUICK HOLDS THIRD PLACE AS PLYMOUTH NARROWS GAP 1955 New Passenger Car Registrations*

Arranged by Makes in Descending Order According to the 1955 Seven Months' Totals

MAKE	SEVEN MONTHS					
	Units		Per Cent of Total			
	July 1955	June 1955	July 1954	1955	1954	1955
Chevrolet	150,077	164,000	119,544	905,912	817,396	21.74
Ford	143,187	140,000	109,883	894,320	816,470	21.23
Buick	64,833	69,974	47,051	446,441	396,640	10.72
Plymouth	58,645	63,567	37,791	402,209	254,219	9.66
Oldsmobile	52,359	54,383	40,426	342,733	235,551	8.23
Pontiac	47,330	50,075	27,221	312,875	206,609	7.51
Mercury	38,114	38,202	24,919	213,419	177,386	5.12
Dodge	23,615	25,980	12,447	169,880	89,627	4.67
Chrysler	13,989	18,627	7,739	96,901	63,231	2.37
Cadillac	10,870	11,740	10,233	84,049	63,960	2.04
De Soto	10,865	11,639	8,956	74,072	46,586	1.78
Studebaker	8,965	9,633	8,463	62,306	50,431	1.89
Nash	8,821	10,666	7,567	57,062	51,202	1.37
Packard	4,918	5,396	2,591	31,706	29,366	.79
Hudson	4,354	4,863	4,276	27,874	21,362	.67
Lincoln	3,225	3,223	3,031	19,727	22,636	.46
Willys	489	575	1,079	4,624	11,379	.12
Kaiser	41	63	759	621	5,553	.02
Wiac. Domestic	17	20	324	223	2,346	.01
Foreign	4,801	4,569	2,294	26,154	13,774	.63
Total—All Makes	647,245	681,372	474,316	4,165,020	3,291,116	100.00

* Based on data from R. L. Polk & Co.

division hired more than 50 top sales executives to help test various types of new programs for its dealer organization. Each program is pre-tested first among dealers in small areas. Once its effectiveness is proven, it is offered to all dealers. Factory officials work closely with them in helping to

carry out the program's objectives.

Programs are being outlined for as far in advance as 10 years. Specialists from various departments are situated in specific regions around the country to furnish "on-the-spot" help to the dealer in all departments.

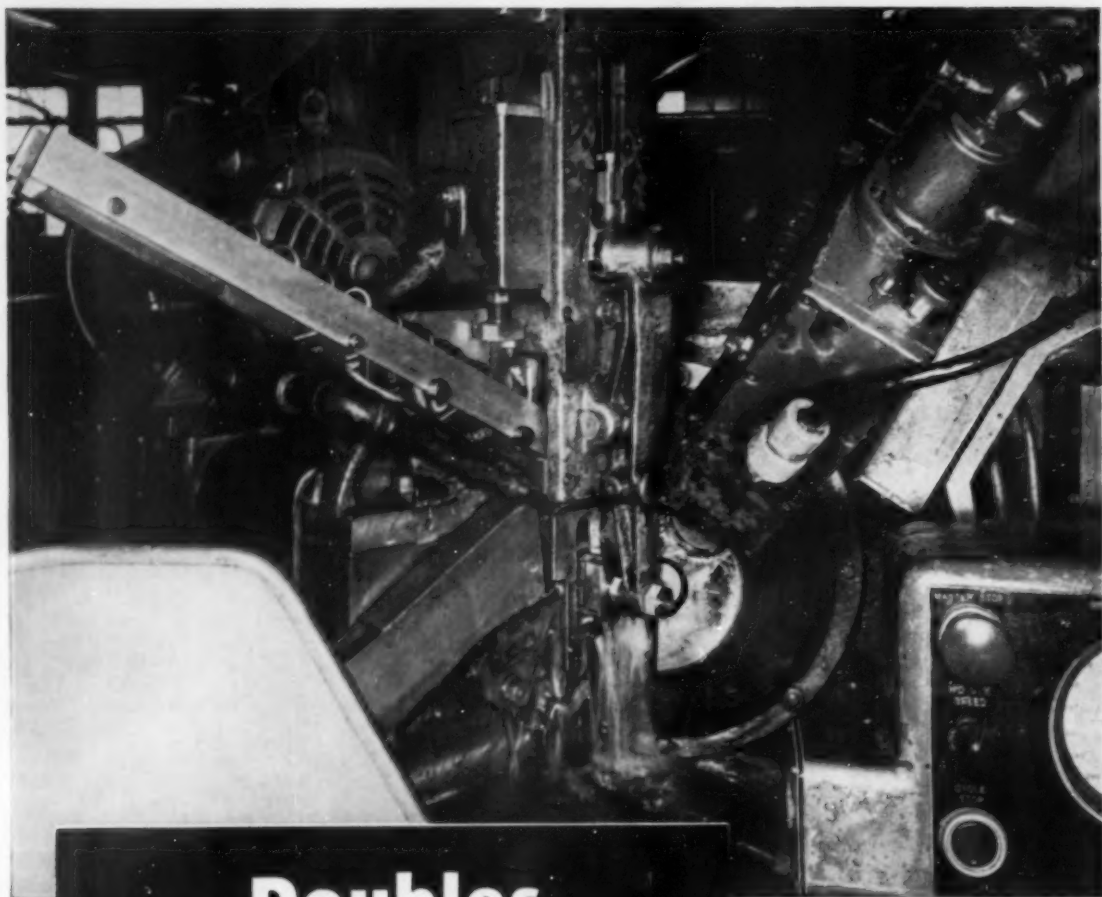
(Turn to page 100, please)

CHEVROLET GAINS EDGE OVER FORD FOR FIRST PLACE 1955 New Truck Registrations*

Arranged by Makes in Descending Order According to the 1955 Seven Months' Totals

MAKE	SEVEN MONTHS						Per Cent of Total	
	Units		Units		Units		Units	
	July 1955	June 1955	July 1954	1955	1954	1955	1954	
Chevrolet	30,056	34,144	24,171	169,516	176,362	32.69	35.34	
Ford	24,378	26,392	19,476	164,766	164,204	31.78	32.84	
International	8,960	9,422	6,885	60,495	49,719	11.67	8.77	
G.M.C.	6,031	6,740	5,276	41,129	41,069	7.93	8.24	
Dodge	6,277	6,387	4,764	36,623	38,647	7.45	7.19	
Willys Truck	1,267	1,334	753	9,252	4,128	1.78	.83	
White	1,224	1,238	864	7,840	7,090	1.81	1.42	
Studebaker	923	1,080	889	6,590	6,539	1.51	1.11	
Mack	877	1,005	573	6,523	3,615	1.52	.72	
Willys Jeep	888	633	689	6,629	4,304	1.67	.96	
Diamond T	367	304	219	2,086	1,615	.39	.33	
Devo	354	343	177	1,829	1,446	.37	.29	
Reo	290	278	186	1,601	1,381	.31	.28	
Bruckway	91	160	166	667	717	.12	.14	
Kenworth	105	88	60	602	417	.12	.60	
Peterbilt	33	52	37	284	217	.06	.60	
F.W.D.	22	18	27	137	284	.03	.06	
Federal	8	5	9	29	284	.01	.04	
Misc. Domestic	199	31	23	822	367	.16	.07	
Foreign	244	191	45	980	172	.19	.03	
Total—All Makes	84,413	90,005	65,181	516,496	466,664	100.00	100.00	

* Based on data from R. L. Polk & Co.



Doubles production per wheel dressing

IN GRINDING bearing cones, this manufacturer (name on request) formerly used two different competitive oils—one to lubricate the machine, the other as grinding oil. Contamination of the machine oil by the grinding oil caused bearings to fail after only about three weeks.

A Texaco Lubrication Engineer was called in. He recommended using a dual-purpose oil to serve as both machine lubricant and grinding oil. Machines were changed over to *Texaco Cleartex Oil* and the manufacturer reports no bearing failures for over a year. In addition, he can

get as many as twenty pieces (with better finish) per wheel dressing, as against the ten or twelve previously obtained.

There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to help you do all your machining better, faster and at lower cost. A Texaco Lubrication Engineer will gladly help you select the proper ones.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

★ ★ ★

The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO

**CUTTING, GRINDING,
SOLUBLE AND
HYDRAULIC OILS**

TUNE IN . . . TEXACO STAR THEATER starring JIMMY DURANTE on television . . . Saturday nights, NBC.

Men in the News



Lipe-Rollway Corp.—George E. Ellis has been appointed general sales manager.

Bendix Aviation Corp.—Rudolph F. Gagg has been named group-executive-staff engineer for eastern divisions.

Temco Aircraft Corp.—John H. Quinn, Jr., has been made chief of technical services, a new position in the company's engineering department.

National Tool Co.—A. C. Erhardt, Jr., has been appointed director of sales.

American Crucible Products Co.—G. R. McWane was made plant engineer.

Ford Motor Co., Tractor and Implement Div.—Anthony Alic was appointed assistant controller.

General Motors Corp.—Lawrence R. Hafstad, director of the Research Staff, has been elected a vice-president.

Harnischfeger Corp., P&H Construction and Mining Div.—J. F. Catalane has become general sales manager, and Robert P. Jones was appointed assistant general sales manager.

DeSoto Div., Chrysler Corp.—Wayne F. Diturisi has been appointed director of business management.

Sylvania Electric Products, Inc., Atomic Energy Div.—Leonard Smiley was made manager of technical coordination.

P. R. Mallory & Co., Inc.—James Hagarty has been appointed sales representative in the Midwest area.



Norton Co.—Warren L. Hardy has been named business research manager.

Ford Motor Co., Special Products Div.—J. Richard Hallock was appointed general purchasing agent.

L.O.F. Glass Fibers Co.—Don McAnally has been appointed sales promotion manager.

Douglas Aircraft Co., Inc., Long Beach Div.—James R. Gage was promoted to military relations manager, and J. J. Wilker was made military sales manager.

Piasecki Helicopter Corp.—Harry B. Horne, Jr., has been named assistant to the vice-president.

Timken Roller Bearing Co.—John Rundt was made chief engineer of the division of research and development, and Alva Kopatz is now chief draftsman for the same unit.



Cadillac Motor Car Div., General Motors Corp.—Harold G. Warner has been appointed works manager.

Central Foundry Div., General Motors Corp.—Thaddeus Giszczak and Paul B. Guilford have been made factory manager and chief metallurgist, respectively, at the Defiance, O., plant.

Republic Aviation Corp.—C. E. Reid is now small business liaison officer.

Copperweld Steel Co.—James M. Darbaker has been elected president.

Plymouth Div., Chrysler Corp.—R. A. McCarroll has been promoted to manager of industrial engineering.

Bendix Products Div., Bendix Aviation Corp.—R. E. Bradley and Arthur C. Burgott are now executive sales engineers.

Chicago Pneumatic Tool Co.—James C. Mabe, Jr., was made manager of plant operations.

B. F. Goodrich Chemical Co.—Thomas B. Nantz was made general manager of plants.

Chrysler Corp., Export Div.—J. E. Palmer has been made manager of the new Special Sales Dept.



Heald Machine Co.—Carl Roby has been named president.

Republic Aviation Corp.—Ralph Bonafede has been named production manager.

Ross Operating Valve Co.—Jack Rowe has been appointed vice-president.

Crown Rubber Co.—Donald C. Johnson is now development manager.

Necrology

James E. Hahn, 63, former president and chairman of the board of English Electric Co. of Canada, died Sept. 1, at Toronto, Ont.

Stanley W. Brandel, 66, chairman of the board of Marlin-Rockwell Corp., died recently at Jamestown, N. Y.

William E. Bonner, 56, production planning engineer for Avro Canada, Ltd., died recently at Toronto, Ont.

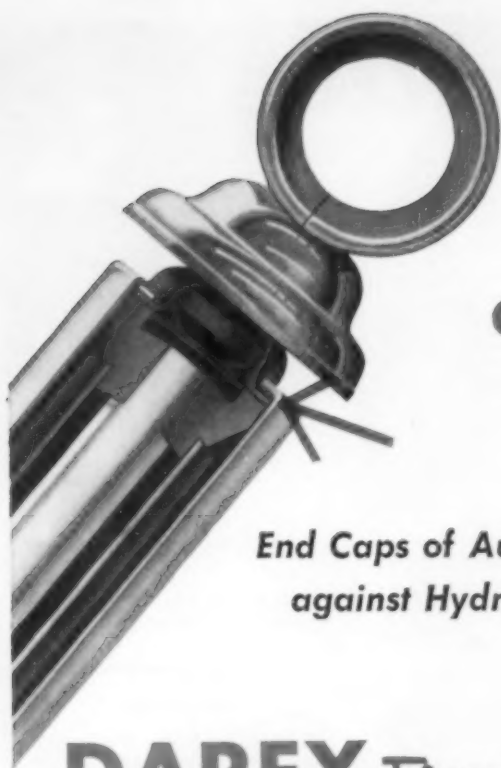
J. A. Ramsey, 66, founder and former president of Ramsey Corp. and automotive piston ring pioneer, died Sept. 5, at Los Angeles, Calif.

Gosta Vennerholm, 56, manager of the Manufacturing Research Dept. of Ford Motor Co., died Sept. 9, at Detroit, Mich.

Harry T. Rowland, 56, president of Hayes Aircraft Corp., died recently, at Birmingham, Ala.

Mervyn E. Sheppard, 54, former general assistant controller for Ford Motor Co., died recently at Detroit, Mich.

John J. McManus, 65, former president of Rolls-Royce, Inc., died Sept. 8, at Brooklyn, N. Y.



Sealed Tight ...without costly welding!

**End Caps of Auto Shock Absorbers now Sealed
against Hydraulic Pressure and Leakage by**

DAREX Flowed-in Gaskets



COMPOUND: N779

One of several standard DAREX "Flowed-In" compounds now being used by the automotive industry

Base	Neoprene
Heat Resistance	good to 300°F
Oil Resistance	excellent
Gasoline Resistance	good
Permanent Set	20-35% ASTM Method B
Color	brown
Consistency — Wet	thick paste
— Dry	rubbery, Shore A hardness 30
Production Rate	
— Automatic	80/min
— Semi-Automatic	40/min
Vulcanizing Time	5 — 10/min

Uses: Wherever gaskets must seal against oil leakage or pressure, as on electric motor bearing caps.

Automotive parts manufacturers, who had used electric welding to seal shock absorber end caps, are now saving thousands of dollars yearly by using the new DAREX "Flowed-in" Process.

Dewey and Almy engineers, after studying the problem, recommended "Flowed-in" gaskets with a DAREX compound. This gasketing material is flowed into place as a liquid, then vulcanized to form a solid, rubbery seal that is unaffected by oil under heavy pressure and temperatures up to 300°F.

End caps are now gasketed and cured, automatically, on a sub-assembly line, doing away with the costly welding process in final assembly line. Production has increased. The overall cost of sealing is much less. Rejects due to "leakers" have been practically eliminated.

Perhaps the DAREX "Flowed-in" Process can increase production or quality of *your* product. And at the same time lower labor and materials costs. If you have a problem involving a circular gasket, cushion, seal, or vibration dampener—send today for the DAREX "Flowed-in" Gasket Brochure illustrated below.

If you make parts like these—



discover what DAREX "Flowed-in"
Gaskets can do for you.
Write for this brochure today!



DEWEY and ALMY
Chemical Company

DIVISION OF W. R. GRACE & CO.
Cambridge 40, Mass.

GEARS

where performance means **MOST**

Shown in this cutaway
of typical Automotive Gear
components are:

BULL GEAR AND
JACK SHAFT

FLYWHEEL
RING GEAR

MAIN DRIVE GEAR,
PINION AND DIFFERENTIAL
GEARS

BELT PULLEY
GEARS

TRANSMISSION
GEARS

When gears are used to transmit power there's no standard of comparison equal to on-the-job performance. This is particularly true of farm machinery, where the dependability of gears is essential in maintaining the planting, cultivating and harvesting schedules.

Automotive Gears are used in a wide variety

of the best-known, best-made farm machines. Their record is worth your inspection—no matter what your gear problem may be. This is particularly true if you are considering a source with the experience, the engineering service, and the facilities to serve as your "gear department." Just write or phone.



FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

Automotive Gear Works, inc.

ESTABLISHED IN 1914

RICHMOND, INDIANA

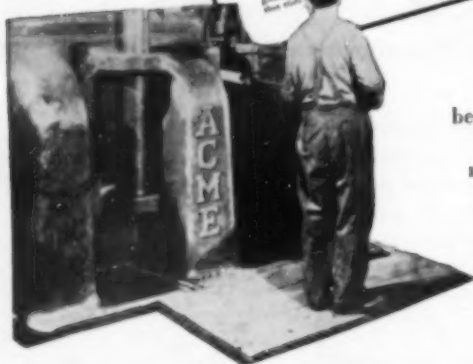


aids

TO MODERN

FORGING

PRACTICE



YOU ARE INVITED to have your name placed on our mailing list to receive this valuable series of articles on up-to-date forging methods. We will be glad to send a complete set of all eleven issues of "The Forger" in addition to placing your name on our mailing list to receive future issues as they are prepared. There is absolutely no charge for this service. We are glad to make this gesture towards the advancement of modern forging practice as executed on ACME XN Forging Machines.

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • 1209 W. 65th St., Cleveland 2, Ohio
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES



Another Reason So Many People Insist
on B&W Mechanical Tubing

BUILDING THE LITTLE CLICK THAT SAYS ALL IS WELL

Every pilot who ever flew an airplane knows that the world's most reassuring sound is the little click that says "landing gear down and locked." It's important because it means a safe landing. It insures coming in on your wheels instead of your belly.

Providing that reassurance is the job of Menasco Manufacturing Company, which specializes in the design and manufacture of landing gear components for the country's leading airframe manufacturers. Critical landing gear design and construction factors include weight conservation, space limitation, faster and more economical production methods, and the increasing takeoff and landing speeds of modern aircraft.

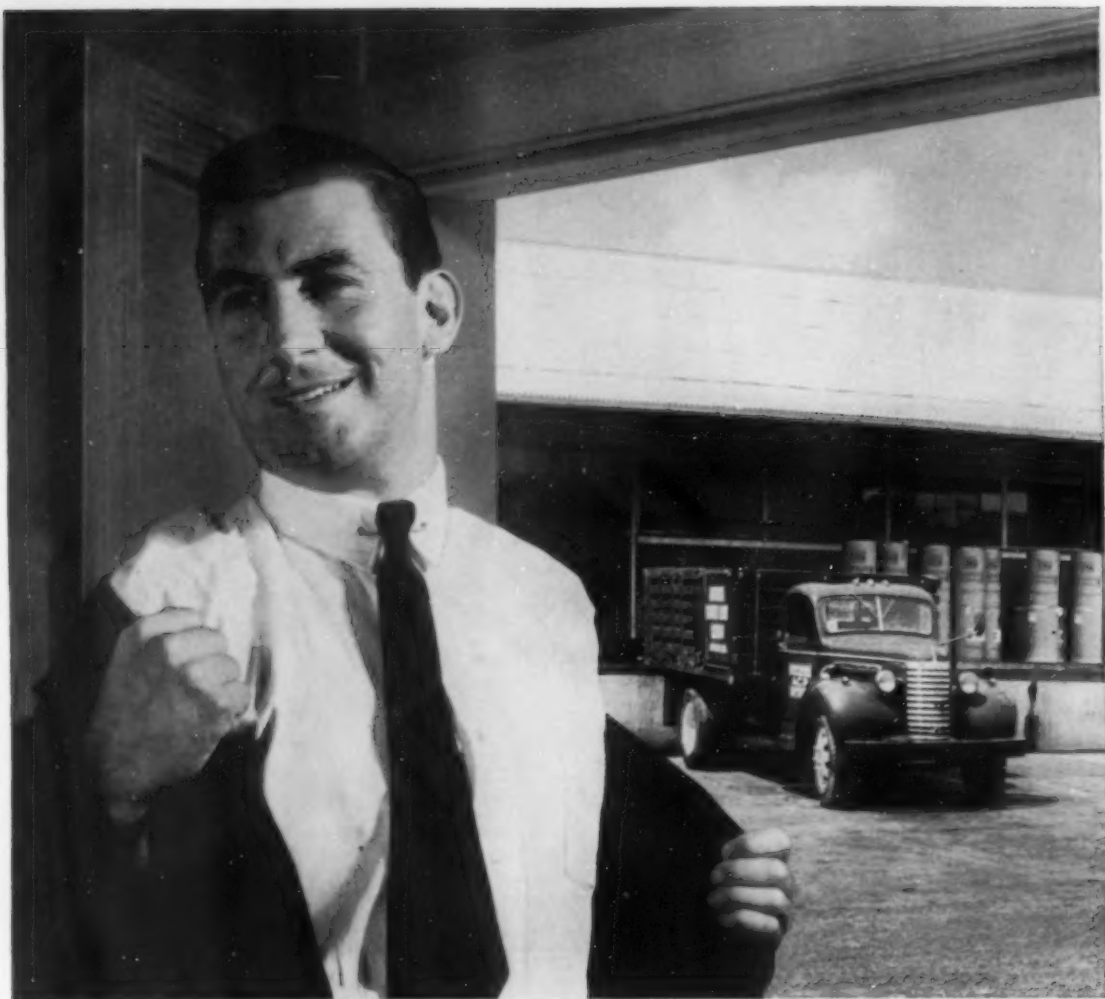
Since 1943 Menasco has been welding B&W aircraft quality tubing of 4340 steel to various kinds of forged shapes to produce the completed piston or cylinders. Menasco's improved pressure welding, called Uniweld, produces high-quality parts that cannot be produced in a single piece by conventional forging methods. The strength and quality of these Uniweld parts is equivalent to that obtained if it had been possible to produce them in a single forged piece.

For your own equivalent of "the little click that says all is well," insist on B&W Mechanical Tubing. Mr. Tubes, your link to B&W, has the whole story. Or write for Bulletin TB-361. *Al.*



THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION

Beaver Falls, Pa. and Milwaukee, Wis. - Seamless Tubing,
Welded Stainless Steel Tubing,
Alliances, Ohio - Welded Carbon Steel Tubing,
Milwaukee, Wis. - Seamless Welding Fittings



WE DON'T STOP WITH THE DELIVERY OF A CHEMICAL — we put it to work and keep it working effectively

The chemical treatment of metals and metal parts—to prepare them for further processing, to protect them, to beautify them—has grown from a haphazard operation to a highly technical one. Supplying the chemical ingredients is a relatively simple job. Putting them to work and keeping them working effectively in your plant demands the skill of an experienced organization. We have that organization.

We supply not only the metal-treating chemicals, but also—free of charge—the technical and engineering service to keep them working at top efficiency. We

furnish assistance in developing and installing the process, we maintain continuing inspection of the process and equipment if you so desire, we check samples of the processed metals in our Quality Control Laboratories—all these are part of the ACP service at your command.

That's why we say, "We don't stop with the delivery of a chemical—we put it to work and keep it working effectively." And we have been doing this for over 40 years. Write for a booklet describing ACP products and services.

AMERICAN CHEMICAL PAINT COMPANY, Ambler 24, Pa.

DETROIT, MICHIGAN

NILES, CALIFORNIA

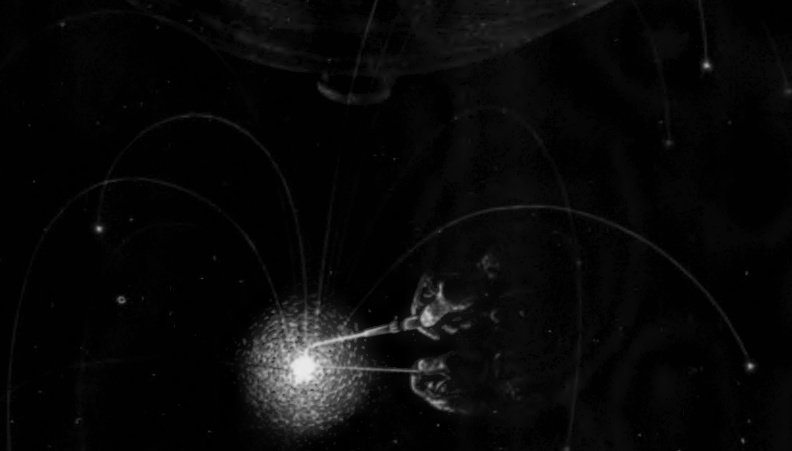
WINDSOR, ONTARIO





0.28/0.33 0.40/0.60 0.040 0.040 0.20/0.35 0.80/1.10 0.15/0.25

4130 steel is your best bet for light sections



4100 steels are your best bet

Chromium Molybdenum Steel like AISI-SAE 4130 is the answer for parts requiring high strength and toughness in light sections. For aircraft parts, heat-treated compressed gas cylinders and other thin sections, the move is to plentiful Moly. For information, write Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.



CLIMAX MOLYBDENUM

NEW Jets and Airliners



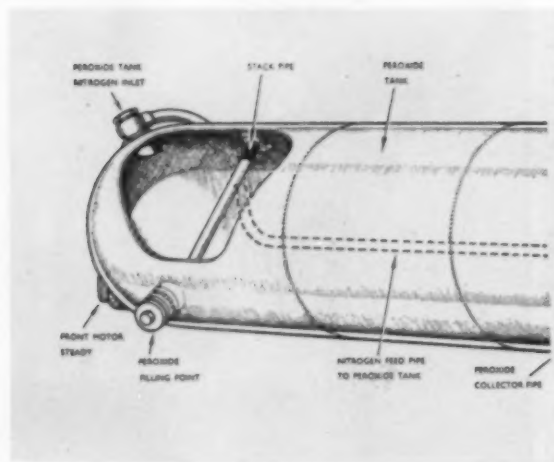
The Folland Gnat has a 22-ft span, only slightly larger than the Midge from which it is developed.

By David Scott

THE Farnborough show early in September indicated that the British aircraft industry is gradually reducing the time lag between projects and production, and is striving to consolidate past gains in research and development. It also suggested that manufacturers are extending their efforts on a number of fronts. Included in the flying display of 40 different machines were several new engines, military planes, helicopters, and transport and commercial airliners seen for the first time at this annual trade show staged by the Society of British Aircraft Constructors.

This year's Farnborough exhibition was marked by an increase in the number of exhibitors—307 firms against 292 in 1954—who occupied 12 per cent more space than last year's record figure of 100,800 sq ft. This reflects the steady growth of the British aircraft industry and its mounting emphasis on exports. Employment in the industry rose from 149,000 in June 1950 to 244,000 at the end of last May. At the same time, total aero exports have risen substantially, and in 1954 equalled \$160 million, ranking fourth among general engineering products in UK sales abroad.

Of special technical interest was the Rolls Royce Conway by-pass turbojet engine, which recently com-



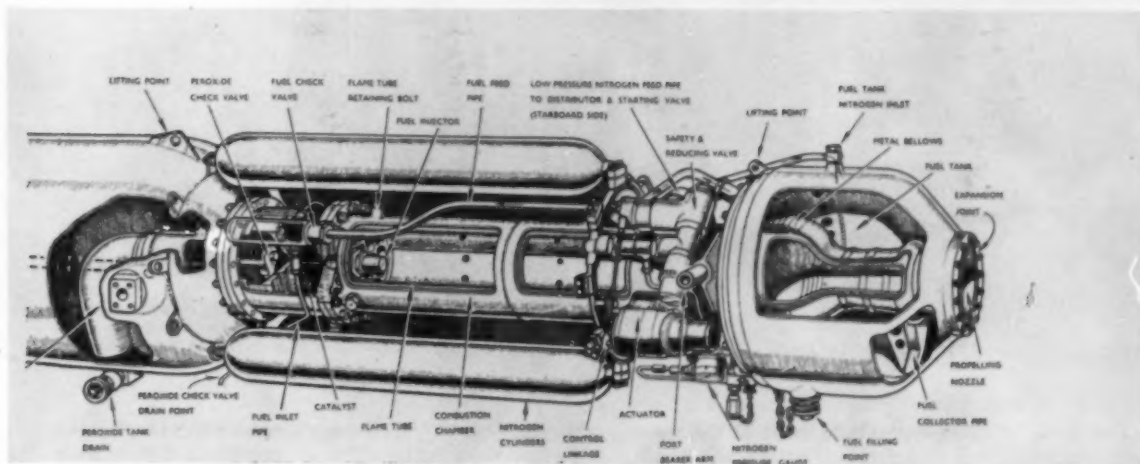
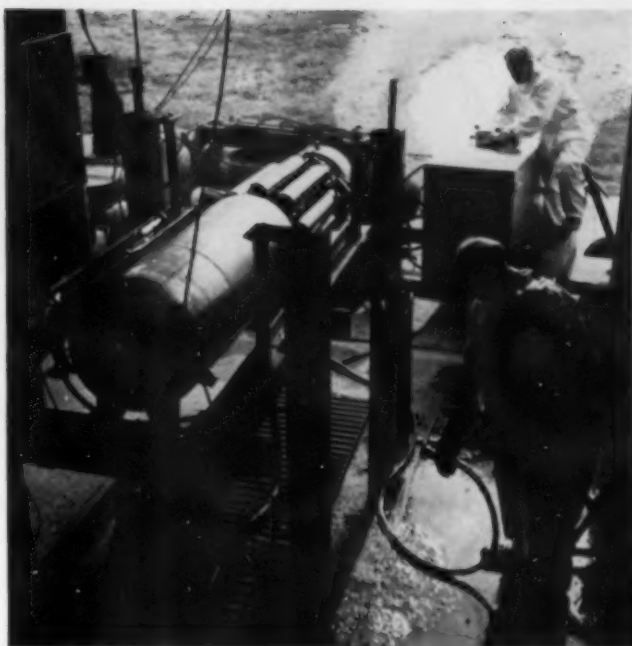
pleted a Government type-test at 13,000 lb thrust. The by-pass design is stated to greatly improve operating economy, and the Conway is claimed to have the lowest specific fuel consumption of any type-tested engine.

In this construction, part of the air leaving the first compressor is ducted outside and past the remainder of the engine to join the jet stream after the final turbine. Thus although the engine works at a high pressure ratio and high internal efficiency, the discharge contains a greater air mass ejected at a lower speed, which diminishes slip and raises the propulsive efficiency. The reduced velocity, together with a new type of Rolls-Royce jet nozzle, also lowers the noise

at FARNBOROUGH EXHIBITION

RIGHT—Super Sprite rocket motor on the test bed at de Havilland's development center. It is designed for take-off assist, and delivers 4200 lb static thrust for a total duration of 40 sec.

BELOW—Basic engine of the de Havilland Super Sprite. Propellants are 57 gal of hydrogen peroxide at 80 to 85 per cent concentration and 5 gal kerosene or wide-cut gasoline. Illustration courtesy of Flight, London.



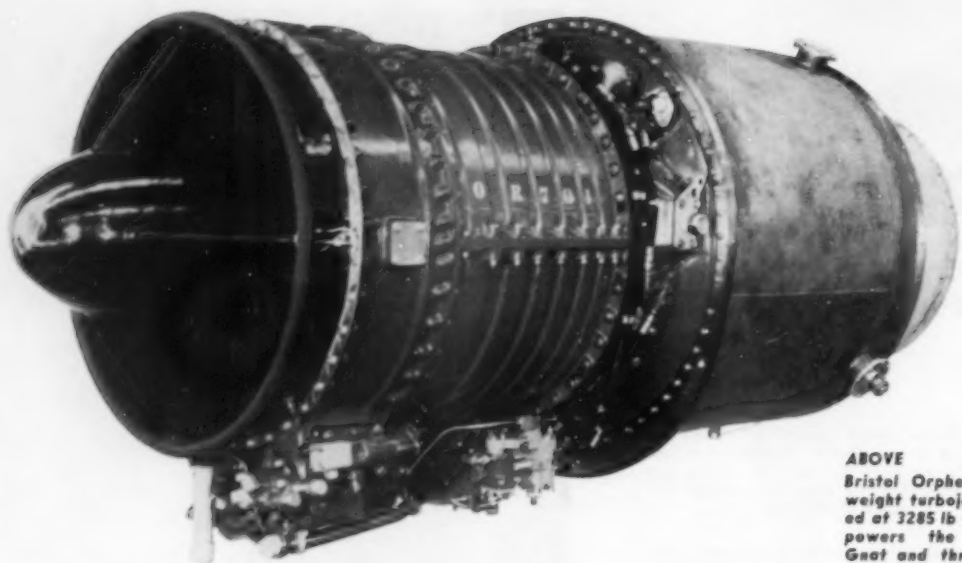
level. In addition, the cooling effect of the sleeve of air surrounding hot parts of the engine simplifies installation of this power unit and eases fire problems.

These features make the Conway well suited for large, long-range airliners and transports. Its first scheduled application is in the Vickers V.1000 four-engined troop-carrier which is on order for the Royal Air Force. At Farnborough it was hung under the fuselage of an Avro Ashton, which is used as an experimental test bed for flight trials, and flew with the other engines idling. While no constructional details have been disclosed, the Conway is believed to be of two-spool design with low- and high-pressure compressors, an annular combustion chamber with nine burn-

ers, and incorporating two sets of power turbine stages.

De Havilland's Gyron also made its public debut at Farnborough, although this engine has been under intensive development for the past few years. On the eve of the show it was announced that a thrust figure of 15,000 lb had been reached in the latest type-approval test, revealing it to be the most powerful known turbojet in the world. This was described as only the initial rating, however, for the final output may be further raised with the inclusion of an afterburner.

The Gyron is intended for supersonic fighters, especially in conjunction with rocket motors to give interceptors rapid acceleration and a high rate of climb into the stratosphere. Tests are under way with



ABOVE

Bristol Orpheus light-weight turbojet is rated at 3285 lb thrust. It powers the Folland Gnat and three European fighters.



Rolls - Royce Conway by-pass turbojet rated at 13,000 lb thrust.

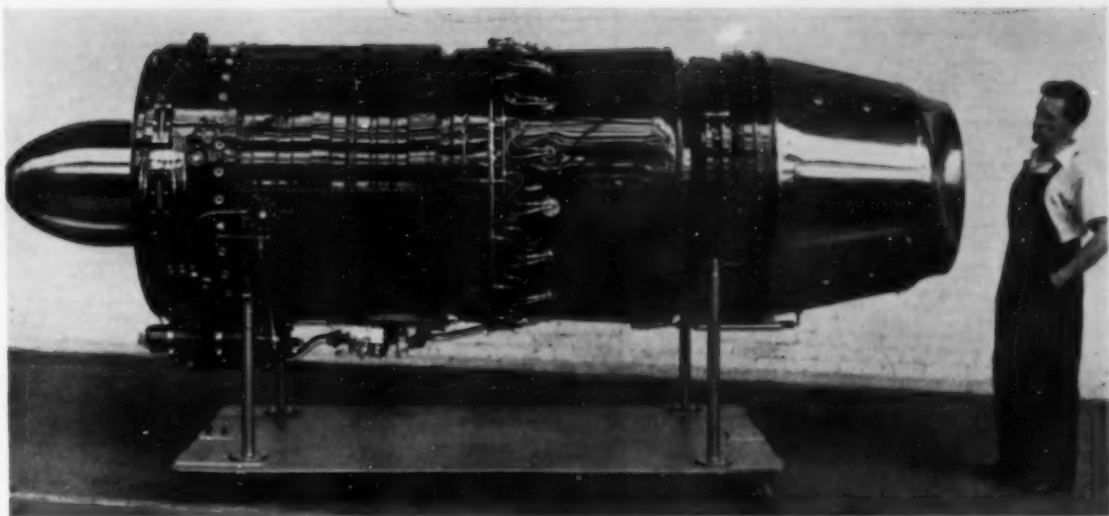
one of these units experimentally fitted in the lower port nacelle of a Short Sperrin prototype high-altitude bomber, and this combination was demonstrated at the air show. No design details are available other than a length of 154 in. and overall diameter, excluding accessories, of 46½ in. It is stated to have a very high power-weight ratio and to be of rugged and simple construction.

The existence of a smaller version, the Gyron Junior, was disclosed by de Havilland, but without any further information. This is being developed under a Ministry of Supply contract, and recently ran for the first time. De Havilland exhibited a sectioned model of the Super Sprite assisted take-off unit, the first British aircraft rocket to receive a type-test certificate. It develops a maximum thrust of 4200 lb for a total of 40 sec. But nothing was divulged about the Spectre liquid-propellant engine intended for matching with the Gyron.

The Bristol Orpheus lightweight turbojet was on

display both at the company's stand and powering the Folland Gnat fighter. This engine was developed from the drawing-board to the production stage (which it has now almost reached) in the short space of under two years, thus supporting the claim that the British industry is capable of moving rapidly. Little is known about aside from a static thrust rating of 3285 lb achieved by the first version during its 150-hr type-test in May. From this it is calculated that the Orpheus has the highest power for its weight of any type-tested engine, the thrust-weight ratio being 4.4 lb per lb weight. Other versions are reported to have given considerably greater output, and the Gnat is now stated to pack 4000 lb thrust.

This engine is of single-shaft layout with an axial compressor, annular combustion chamber incorporating seven separate flame tubes, and a single-stage turbine. Length from intake face to exhaust flange is 73 in., and diameter is 32.4 in. Bristol states that the Orpheus makes no radical departure from well-



The 15,000 lb thrust de Havilland Gyron, claimed to be the most powerful jet engine in the world.



Fairey F.D.2 for supersonic research. The needle nose, hinged behind the cockpit can be lowered to improve the pilot's downward field of vision during take-off and landing.

tried practice, and that it is simple to manufacture, operate and maintain. Aside from the Gnat, it is specified for the Fiat G91, the Breguet Taon, and the Dassault Mystère 26.

Bristol also exhibited the Olympus 101, a development of the engine made by Wright as the J67. Type-test rating of this unit is increased from 9750 lb to 11,000 lb static thrust without afterburner, while specific fuel consumption is stated to be only 0.766 lb/hr/lb. It is now in production for the Avro Vulcan medium bomber, and was flown as well at Farnborough in an English Electric Canberra.

Just before the show opened Armstrong-Siddeley announced the existence of the Sapphire 8, but this was not displayed and nothing is known about it. At

the same time they reported that three of their engines had been up-rated: the Sapphire 7 to 10,500 lb thrust, the Double Mamba 3 to 3035 ehp, and the Viper 8 to 1750 lb thrust.

The English Electric P.1 interceptor—Britain's first fighter capable of supersonic level flight—made its initial appearance. It is powered by a pair of Sapphire engines placed one above the other in the fuselage with a common air intake in the nose. Wings are thin and sharply swept in V-form, with ailerons fixed transversely on the trailing tips. The low-set tail-plane is of the same pattern. No details of performance or even size have been disclosed. The P.1 was demonstrated in several low runs over the field, but was not on view on the ground. Twenty pre-production models have been ordered for development trials—another instance of the effort to reduce the time lag between conception and application.

The Fairey F.D.2 delta-wing single-seater likewise was publicly unveiled. This supersonic research craft features an extremely thin wing set well back along



English Electric P.1 supersonic fighter. Two Sapphire engines are stacked vertically in the fuselage.

the finely-tapered fuselage with no tailplane. Since the cockpit promontory is very slight, the elongated nose is hinged to drop forward, improving the forward view for the pilot while taking off, landing or taxiing. The angled front can be lowered or raised on the ground or during flight. Engine is a Rolls-Royce Avon with provision for afterburner. The flight display of the F.D.2 was concluded by a nose-down landing braked by a cluster of three parachutes. Span is given as 26 ft 10 in., and length 52 ft 3 in.

The Folland Gnat light fighter was on show for the first time. Only slightly larger than the Midge which preceded it, this diminutive plane has a span of 22 ft 2 in. and is 29 ft long. The Bristol Orpheus with which it is equipped gives more than twice the power and makes possible exceptional performance, although all figures are secret. Power-operated inboard ailerons provide a high maximum rate of roll which is now stated to be at least 200 deg per sec over a wide range of speeds and altitudes. Exceptional maneuverability and pilot response is claimed for the Gnat, and during its demonstration flight it followed a vertical climb and steep dive with a tight high-speed turn inside the limits of the Farnborough field.

Folland is planning a carrier-based version of this tiny fighter—the Sea Gnat. In view of its small size no provision for wing-folding is needed. Main

advantages claimed are reduction in ground crew due to easy servicing, and the possibility of accommodating 2½ times more planes in the hangar. Modifications will include a long travel undercarriage leg and the inclusion of an arrestor hook and catapult spool attachment.

Two new versions of the Hawker Hunter were displayed. One of these was the prototype two-seater
(Turn to page 116, please)



Fairey's Ultra-Light helicopter is powered by a Blackburn-Turbomeca Palouste. Production models will have three tail fins and rudders.

ENTHUSIASM and attendance ran high at the SAE's Golden Anniversary Tractor Meeting and Production Forum held in Milwaukee last month. There were seven production panels on such subjects as quality control, gears, supervisor evaluation, tool design, indirect manufacturing costs, welding, and production control. One of the most interesting conferences, that on quality control, brought out that all new machines should be thoroughly checked and made to go through production runs before leaving the plants of the machine tool builders. It is believed that there should be a new clause in contracts for new equipment. This clause should read "machine must be qualified." The trend of this meeting naturally dealt with the fact that the product should be engineered and produced so that proper quality can be obtained economically. There was some talk about how to use quality control in a small shop. One engineer discussed what is termed the cell chart. This chart is an adaptation of average and range types charts for machining different parts to different tolerances. Such a chart gives the trend and the optimum control limit based on a five-piece sample. It was felt by all that manufacturers need a better insight of quality control techniques.

At the tool design meeting there was much discus-

SAE Tractor Meeting

sion concerning a scientific formula for machine tool replacement. Many feel that the MAPI formula is not the final answer and neither is the new tax write-off. Engineers stated that small or medium size plants can only afford some percentage of the money available for replacement. It was rather unusual that no mention was made of either machine tool rentals or bailment lease type purchases. Also at this meeting, it was disclosed that several of the larger companies are organizing manufacturing research divisions. These divisions are being set up to cut costs, improve the coordination between the design engineer, the tool engineer, and the production engineer and also to establish committees for the purpose of cutting manufacturing costs. One of the main problems encountered is a source of trained people for process and methods engineering departments. Some of the companies are obtaining people from within by training, and others are taking college graduates; but it is felt that a more definite program should be established.

On the subject of evaluating supervisors, panel leaders, as well as those in attendance, brought out that more consideration should be given to company schooling and setting up the proper history and personnel records. Very often, it is necessary to obtain outside assistance, such as for psychological testing. One of the main problems is in keeping supervisors

happy. Most companies feel that they are paying their supervisors according to their knowledge, and others just elevate titles. It was questionable as to which system was the most predominate. There does appear to be a trend of bringing men up from within the organization.

Management is paying more heed to production control departments, as it was established that these departments are able to obtain the pertinent facts on a company's manufacturing operations. Everyone at the production control meeting was much concerned with what technique they should use to accomplish their purpose. Actually, there is no formula that can be given, since the system has to fit the needs of the individual producer. Of course, on the subject of systems, most of the companies are using more and more business machines for the purpose of special analysis that are so necessary in today's business. It was brought out that there is a current trend toward companies building inventories.

Naturally, at the meeting on indirect costs, everyone was interested in shaving down their dollar outlay for this particular share of the finished product. There is a feeling that more and more evaluation is needed to determine the exact indirect cost and then the proper analysis in order to cut those costs.

There were three subjects which received the most interest in the welding session. These were resistance and fusion welding methods, consumable electrodes, and the development in the use of contact electrodes. There has been a rather rapid advance in recent months in consumable electrodes and the use of carbon dioxide as a shielding gas. It was felt that contact electrodes are more economical to use in most cases. Automation in welding was also discussed with much interest. Two of the companies which are doing much research on carbon dioxide shielding are General Electric and A. O. Smith.

The panel on manufacturing gears and heat treating techniques showed much interest in shot peening. It was stated that by the use of small shot to get the proper arc height and by leaving the product in the shot peening machines a little longer that companies were obtaining gears with a much better life. Many engineers agreed that hot salt quenching, induction hardening and the shot peening of gears are a trend in the tractor industry. These engineers also talked about a new type spiriod design worm gear used for greater reductions and higher loads.

Engineers proposed that control and maintenance operations be simplified on tractors and off-the-road work vehicles. Multiple controls and inaccessible parts tax human capacity, they explained. Simplifying machinery is easier than breeding people with more hands, feet and eyes. The meeting was informed by R. C. Navarin and Karl H. Usow, of the Corps of Engineers, U. S. Army, that the increasing use of automotive equipment by the military forces necessitates immediate simplification of controls and of maintenance operations. They proposed designing for

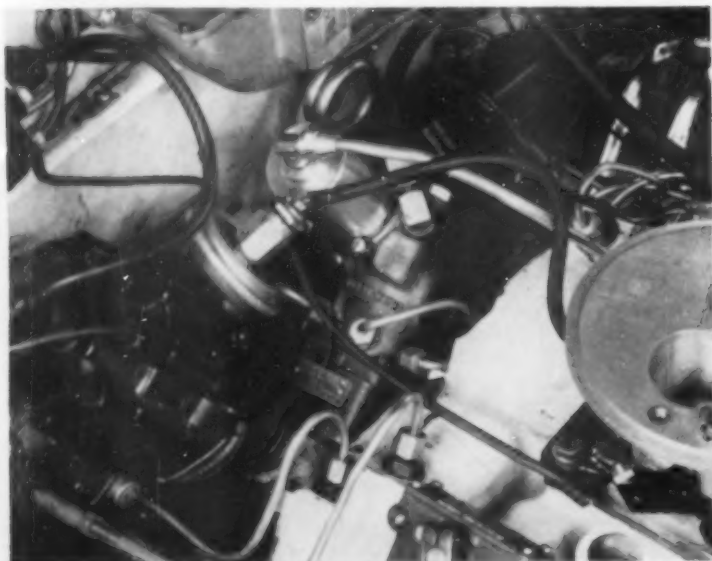
(Turn to page 130, please)

Intense Activity In Fuel Injection Research

By Thomas Mac New



The du Pont Petroleum Laboratory fuel injection setup on a Lincoln V-8



Mounted on the Lincoln V-8 engine, the American Bosch pump is driven off of the distributor gearing

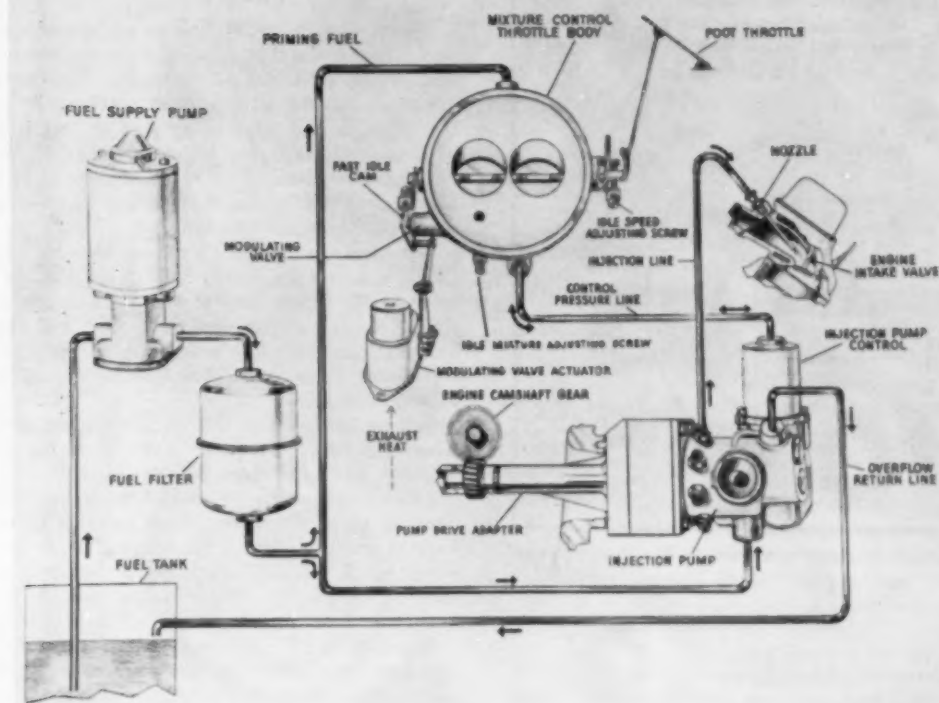
THERE have been scattered but rather persistent rumors in recent months regarding the use of gasoline fuel injection equipment on new V-8 passenger car engines. Because of the current interest in the subject, we are presenting this article which is based on reports of engineering research in the field of fuel injection.

For many years, manufacturers of fuel injection and allied equipment have been carrying on research concerning the merits of fuel injection for passenger cars. Now, in addition to the equipment makers, most all of the automobile producers have established serious research projects in such a system. One major company in the petroleum and chemical field is also experimenting with a high pressure fuel injection system.

Before going further into the various phases of research, let us extol the virtues of fuel injection as claimed by the various interested firms. From the standpoint of the body designer, such a system could mean a lower hood line which might mean more esthetic appeal and naturally better road visibility. Performance-wise, fuel injection would mean more horsepower and better economy at least at the high end of the engine rpm curve. A corresponding increase in torque at a lower speed range is also characteristic. The peak torque developed by an engine with fuel injection moves down about 500 rpm and the curve flattens out. Furthermore, such a system can deliver the better performance characteristics with a somewhat lower octane fuel.

In regard to fuels utilized,

GASOLINE INJECTION SYSTEM



Bosch fuel injection system in a du Pont test car

the gasoline producers might be able to go to higher vapor pressure and higher end point fuel. This could mean more gasoline per barrel of crude.

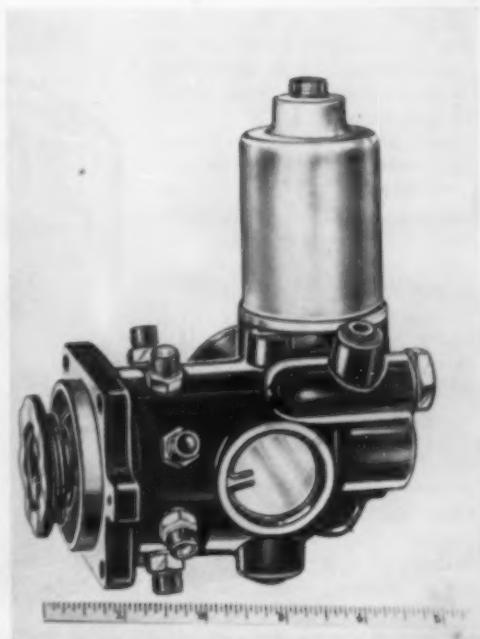
Fuel injection systems obtain better engine performance by improved cylinder to cylinder fuel distribution and by better volumetric efficiency. With injection there is little pressure loss and hot spots may be eliminated. Cold starting performance should improve and there should be less tendency for vapor lock. There is also the possibility that a fuel cutoff could be utilized during deceleration periods.

Another important feature is that the manifold, valve porting and valve timing may be selected to improve engine volumetric efficiency.

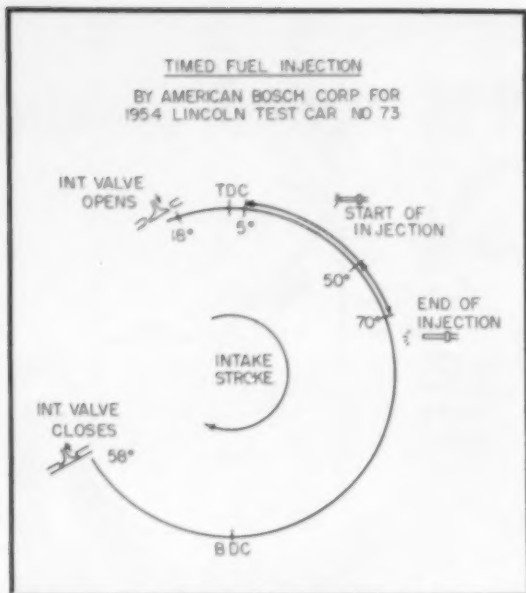
The du Pont Program

Considerable exploratory effort has been put forth by the Petroleum Chemical Division of du Pont in engineering research on the subject. That division has a two-fold purpose in its program. One, of course, is a distinct service to industry by providing data on its fuel injection project. The other purpose is to investigate fuel problems which may result with fuel injection equipment on passenger car engines.

For the testing program, du Pont installed an American Bosch high pressure system on a 1954, V-8 Lincoln passenger car. There were no major modifications to the



American Bosch eight-cylinder gasoline injection pump



Timing cycle of the Bosch equipped du Pont fuel injection test car

engine. The manifold fuel injection system consists of the injection pump, mixture control throttle body, filter, supply pump, and the injector nozzles.

The injector pump in the installation is driven off of the camshaft distributor drive gear with the pump mounted at a right angle to the distributor. This, of

course, is a modified installation and would not necessarily be the way that such a system would be factory installed on stock engines. The fuel injectors have a one piece housing with a small poppet type valve in the injection end. One thing that is very important with an injection system is the fuel filter, as the gasoline must be clean. Dirt can and does clog nozzles. For an even flow of fuel to the injection pump an electric supply pump is utilized.

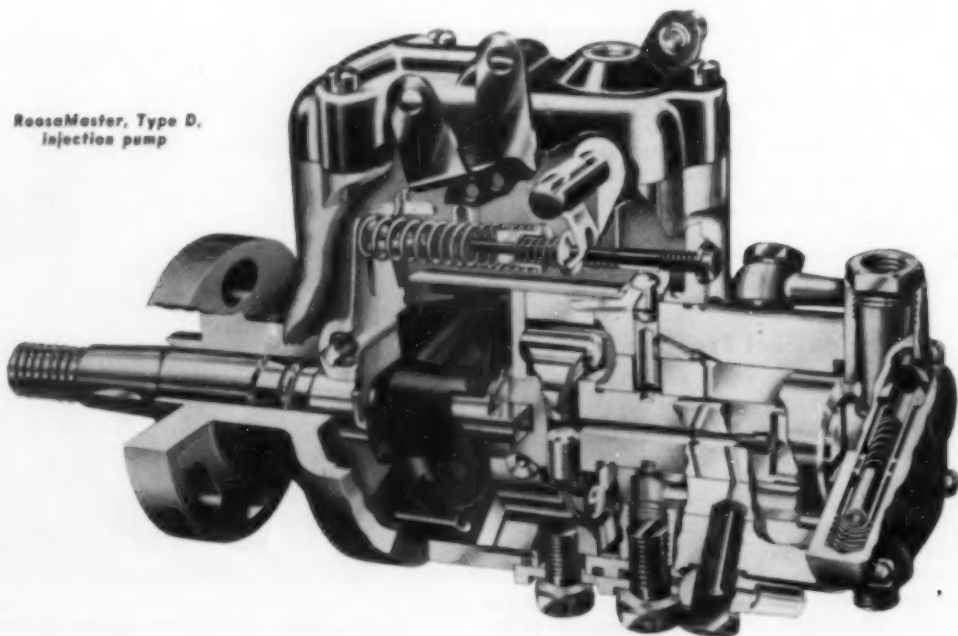
With this system, the Petroleum Chemicals automotive engineers use a timing cycle of opening the intake valve 18 deg before TDC at wide open throttle. Injection is started at five deg after TDC and continues until 70 deg after TDC. At part throttle, injection starts later in the cycle. The intake valve is closed at 58 deg after BDC.

Getting into some of the test results, the petroleum laboratory found that their injection engine gave six to seven per cent more horsepower than the stock engine. For best power spark timing, fuel injection required about the same octane gasoline as the carbureted engine. With both systems set at the same power spark timing, fuel injection required a much lower octane rating. With injection, additional power may be achieved by using high end point gasoline.

In regard to fuel and air distribution to the various cylinders, injection of the fuel at each intake valve of course means there will be a little change of mixture ratio between cylinders. The percentage of variation from average air-fuel ratio between cylinders is not more than plus or minus 2½ per cent either at low or

(Turn to page 120, please)

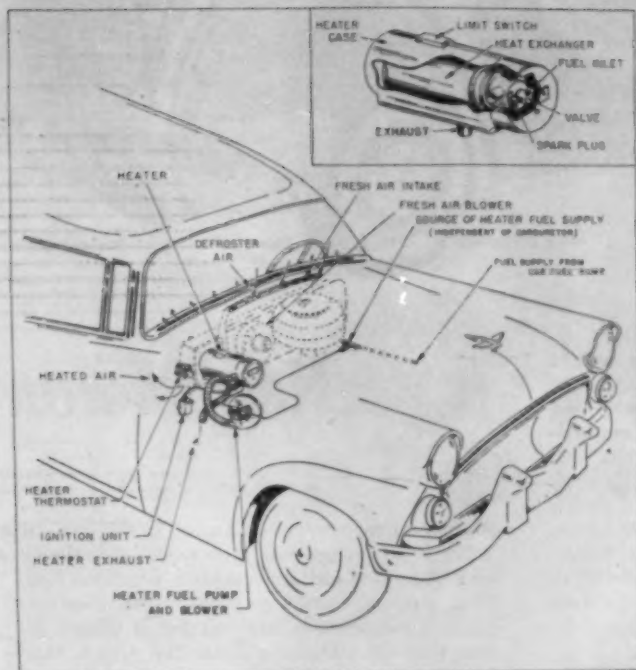
ReasaMaster, Type D,
Injection pump



... New Heater for Passenger Cars

is

INDEPENDENT of Engine



Arrangement of heater and its components. Cutaway view at upper right shows main element.



Typical installation of the new heater.

SOUTH Wind Div. of Stewart-Warner Corp. has announced a new automobile heater of the combustion type, featuring delivery of fresh air almost instantaneously, the maintenance of a preselected temperature in the car, and adequate heating and defrosting capacity to meet extreme operating conditions.

The new heater will be ready for use as optional factory-installed equipment on two 1956 passenger car models. While operating independently of the car's engine or cooling system, it will utilize the standard heat distribution system built into the car. Located under the hood, the new South Wind has its own fuel pump and combustion air supply, as well as spark ignition. Controls in the driver's compartment are of conventional types, and are said to permit automatic temperature control of air delivered into the car through a range of 65 to 180 F. Output is stated to be of sufficient volume to change the air in the car every 60 seconds.

The heater is principally comprised of a cylindrical stainless steel heat exchanger, a nozzle-type atomizing burner, and a motor driven pump and blower assembly to furnish fuel and combustion air to the burner. The system also includes a heater case, a thermostat, and an ignition unit consisting of a vibrator, condenser and high tension coil.

Overall length of heat exchanger and burner, including fuel valve, is 13¾ in. The outer case is slightly larger, the exact dimensions depending upon details of installation.

The heater is wired electrically through the instrument panel heater switch and ignition switch. When both are ON, the fuel-air mixture within the heat exchanger is ignited by a spark plug energized by

(Turn to page 112, please)



The 1956 Mercury Custom Medalist

A 312-cu in. V-8 basic engine, available with a range of three different compression ratios and with top rating of 225-bhp, and fitted with a 12-volt electrical system, heads the roster of mechanical improvements in the line of 13 Mercury models for 1956.

Featuring appearance changes and fresh interior styling, the new line consists of the following models and body types: Custom line—1-dr. sedan, 2-dr. coupe, 2-dr. sedan, 2-dr., 6-pass. station wagon, 4-dr. 8-pass. station wagon, and the addition of the Medalist, a lower priced 2-dr. sedan; Monterey—Coupe, 4-dr. sport sedan, 4-dr. sedan, station wagon; Montclair—4-dr. sport sedan, convertible, and coupe.

The powerplant is essentially of the same basic design as before. However, it has a larger bore, longer stroke, a new crankshaft, and a new camshaft to provide higher valve lift and smoother valve actuation.

New Mercury

Mechanical tappets are continued in the new models.

The 9 to 1 compression ratio engine is available only with Merc-O-Matic and requires premium fuel; the other versions operate on regular fuel as before. The 8.4 to 1 compression ratio version is offered for use only with Merc-O-Matic, while the 8 to 1 engine is intended for use with overdrive and conventional transmission.

In designing this new engine Mercury engineers devoted considerable attention to refinements in combus-



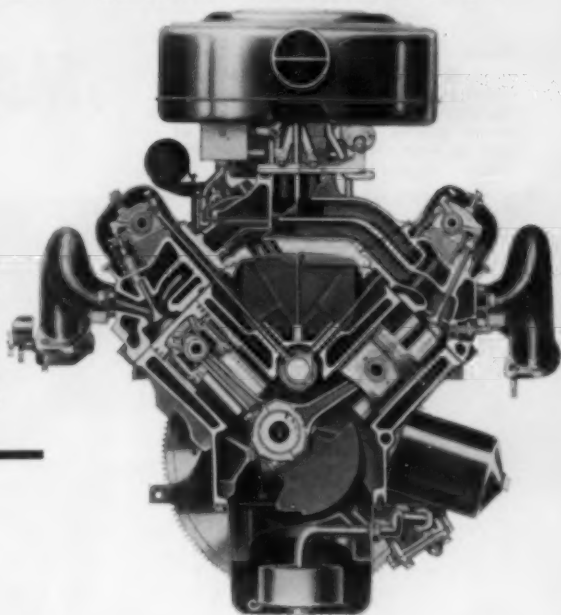
Mercury Montclair coupe

CONDENSED MECHANICAL SPECIFICATIONS

Mercury, Overhead Valve V-8 Engines

Compression ratio	9 to 1	9.4 to 1	8 to 1
Bore (in.)	3.000	3.000	3.000
Stroke (in.)	3.885	3.885	3.885
Displacement (cu in.)	312	312	312
Compression ratio	9 to 1	9.4 to 1	8 to 1
Bhp rating (max.)	225 @ 4000 rpm	215 @ 4000 rpm	210 @ 4000 rpm
Torque (lb ft) max.	324 @ 2800 rpm	317 @ 2800 rpm	312 @ 2800 rpm
Bhp/cu in. (max.)	0.720	0.688	0.670
Torque/cu in. (max.)	1.04	1.01	1.000
Application	Only with Merc-O-Matic	With overdrive and conventional trans.	

Transverse section of the new Mercury engine



Has 12-Volt System and Engines in Three Compression Ratios

tion chamber shape to provide smoother conformation within the cavity and to reduce exposed surface area. Moreover, special consideration was given to water cooling of the head, particularly around the valves and spark plugs to eliminate all sources of hot spots. All of these details, together with improvements in carburetion and spark timing, have combined—accord-

ing to Mercury engineers—to give exceptional smoothness and freedom from combustion harshness.

New four-barrel carburetors of larger size and fitted with an integral choke mechanism have been adopted, using two major suppliers. A unique feature of the choke mechanism is the introduction of a special

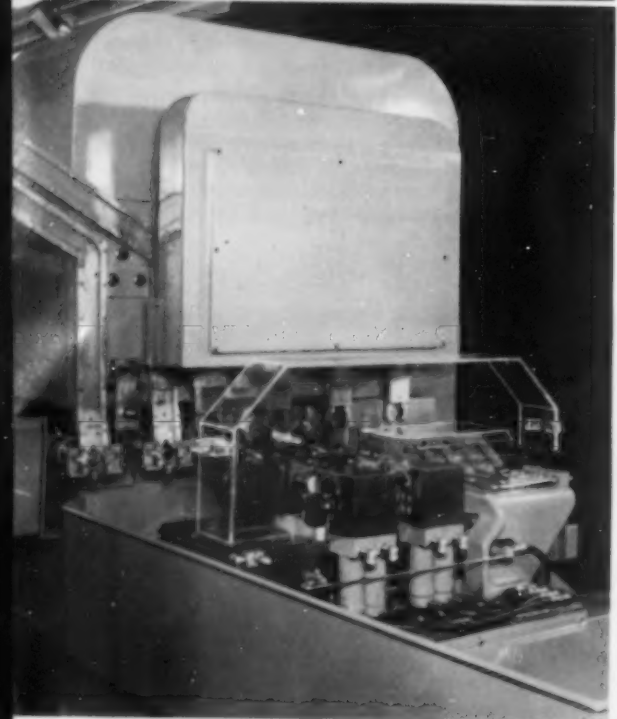
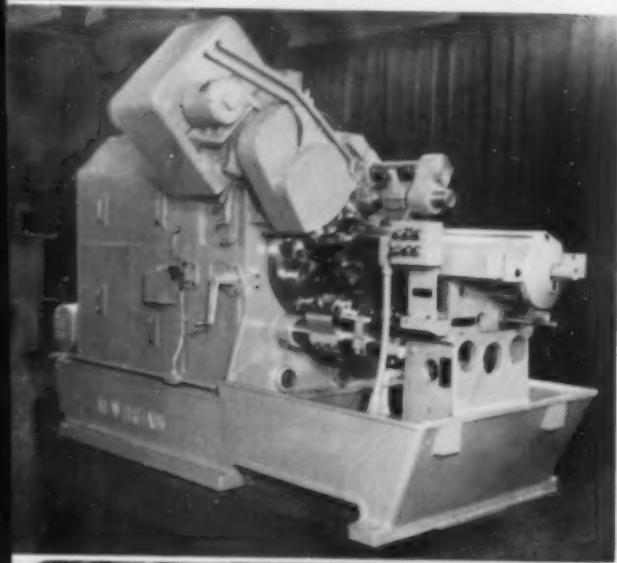
(Turn to page 110, please)



Mercury Monterey coupe

Below:

New Britain-Gridley Model 865 automatic chucking machine being installed, featuring Houtou loader and automatic gaging. It handles variety of cuts on inner ring at over 350 sfm, 211 pieces per hour.



New Britain-Gridley model 37 cam-controlled precision boring machine with Houtou automatic loader, tooling for two shoulder bushings. Fully automatic gaging included.

MANY ADVANCEMENTS



One section of

LOWER costs, higher production, and better quality control received more concerted attention for two weeks last month than for any similar period in history. Engineers and executives invested at least three million man-hours to find new ways to work metals faster, better and more profitably. Attendance was estimated by the NMTBA at over 100,000, with over 3000 being visitors from 28 foreign countries.

That the Machine Tool Show and the other concurrent displays in Chicago last month were successful was shown by firm orders. Sales to foreign countries well ahead of expectations were reported.

The Machine Tool Show featured a much larger number of transfer machines, as well as more huge presses, than did the 1947 show. Automatic controls and automatic loading equipment, engineered for specific jobs on more or less standard machines, were standout attractions. As forecast (AI, Sept. 1 issue), there were a great many complete setups for processing such workpieces as crankshafts, valves, bearing races, and gears; using transfer machines or automation between individual machines. Automatic cycle control, an almost unknown art in 1947, was well represented. Automatic inspection of workpieces was featured on a number of grinders, chuckers and other machines. Signaling devices controlled by the inspection gages tell the oper-

in Modern Machine Tools.... Displayed

at

**CHICAGO
SHOW**

**By
Paul
C.
Kennedy**



the huge exhibit of Cincinnati Milling Machine Co.

ator when the workpieces are being processed at or near the upper or lower limit.

Glimpses of things to come in machining could be seen at several booths. A LeBlond lathe with Hydro-Trace was being controlled by sound waves, to make aluminum ash trays with a recording of the visitor's voice cut into it. Several exhibitors were cutting mild steel experimentally with ceramic tools—aluminum oxide compounds by Carboloy—at speeds on the order of 2000 sfm. Not yet available commercially, ceramic tool bits were also shown by Norton Co., developed in cooperation with Watertown Arsenal.

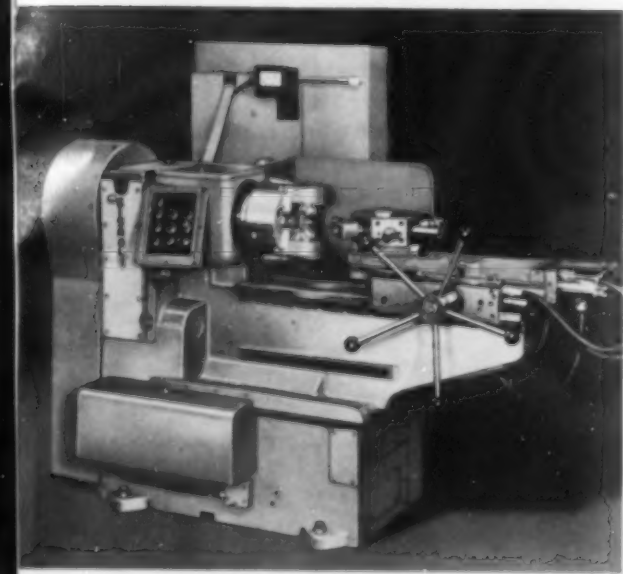
Cincinnati Milling Machine Co., with the largest display at the show, introduced a new line of dial type milling machines. Built in Nos. 2, 3 and 4 sizes and plain, universal and vertical styles, the machines are largely push-button controlled. So-called "full automation" was shown on a number of grinding machines. The equipment includes electric gage sizing, wheel compensation, constant cycle time, all combined with auto-

A Large Percentage of the Equipment at the Machine Tool Show as Well as New Developments at the Production Engineering Show and Coliseum Machinery Show Were Described and Illustrated in the Sept. 1 Issue of AUTOMOTIVE INDUSTRIES. Here Are Some of the Machines Displayed at the Machine Tool Show which Had Not Been Released at the Time that Issue Went to Press

matic loading where practical. Several Filmatic grinders, plain and angular wheel types, were shown with this equipment, as well as the No. 2 Centerless and the Micro-Centric grinders. Several production machines were shown, including the No. 2 and No. 3 Micro-Centrics, the No. 2 finishing two bearings at one time. Tracing from a line drawing was demonstrated on a Hydrotel. The device added to the machine follows the drawing with a light beam which actuates an electronic-hydraulic duplicating system said to be accurate within a few thousandths of an inch. The Universal Elektrojet electrical discharge process was demonstrated using a brass tool to drill $\frac{3}{8}$ -in. holes in small carbide blanks. (Continued on next page)



Setting up a Pratt & Whitney jig borer with an electronic measuring and work positioning system.



Gisholt No. 3 Masterline Electram lathe was demonstrated on parts machined on two or more sides or ends.

The Air-Oil-Matic drill unit was demonstrated at the Morris Machine Tool Co. booth, on the gun drilling process. SAE 4140 steel was being drilled at 270 sfm. At 2700 rpm a 3½-in. long hole was drilled in 43 seconds, with less than 0.001 in. per ft of run-out, with 0.0003 in. TIR and 15 microinches surface finish. The hollow carbide-tipped drill was supplied with coolant at 300 psi, to cool and flush out chips.

Highlights of the Monarch Machine Tool Co., not previously announced, included a numerical sequence programmer and a three dimensional contour turning device. One of the model 21 Mona-Matic chucking lathes featured automatic loading, while another had a constant surface speed device. A fully instrumented machinability lathe was demonstrated for checking steels.

One of the first products of the Special Machine Div. of Kearney & Trecker, a five-station 60-in. rotary index type milling machine, performed 17 operations on rear axle differential carriers. The machine uses 15 standard units; five feed slides, one quill feed drill unit, two drill power units, the index table, column, and five bed extensions. The three milling heads and three drilling heads combined to produce 82 pieces per hour.

W. F. & John Barnes had a small model of a six-station rotary molding machine. It is designed to produce 120 copes and drags per hour with one operator. Maximum flask size is 20 by 30 by 17 in. and three sets of patterns can be worked at once.

Automatic loading of cylindrical grinders was demonstrated by Norton Co. The loading device can be adapted to a wide variety of small parts that can be rolled by gravity on inclined rails. The turret type device supports the work near both ends. The operator, or a suitable conveyor, loads the rails, and single parts are released to the turret. A swinging arm hydraulically actuated by the machine cycle locates the piece in line with the work centers.

Gisholt Machine Co. displayed a variety of fiber glass plastic shapes—panels, dials, covers and guards for the Masterline machines. In the lots required for their normal production, Gisholt figures a typical plastic panel weighing 21 lb costs less than \$50, compared to an aluminum part weighing 112 lb and a cast iron panel of 400 lb each costing \$160. Gisholt is in a position to supply molded shapes to the trade.

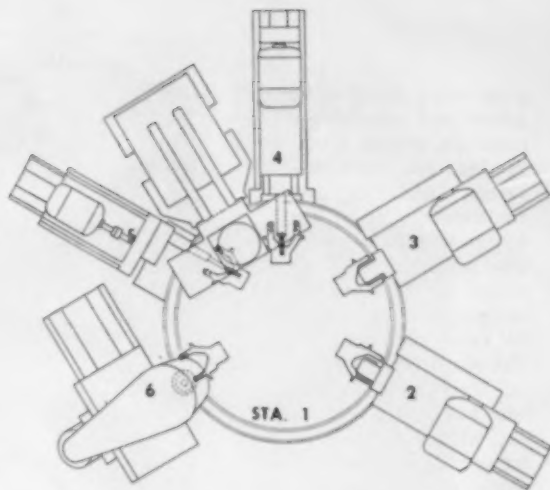
Carboloy Dept. of General Electric Co. announced a carbide surfacing technique which is not yet commercially available. The process will produce a surface hardness of 89.3 RA on such items as cams, drill jig bushings, and cylinder liners. The new cemented oxide cutting tool process, which is being widely discussed, was described at the booth. In addition, experimental tools of this new ceramic material were shown in action at the Gisholt, Jones & Lamson, LeBlond and Warner & Swasey booths.

Bausch Machine Tool Co. showed its mechanical power unit drilling cast iron pieces at 240 sfm. The material was cast iron, the drill diameter was 7/16 in., depth of hole was 5/8 in. and feed of the drill was over 18 ipm.

The Lo-awing people, Seneca Falls Machine Co., showed a fully or semi-automatic high speed lathe, model AP, for machining stepped shafts in small or medium lots. A simple type of master template produces the size and profile, and fully automatic back squaring attachments can be supplied for facing and undercutting.

Bodine Corp. demonstrated how it met a special requirement with a standard model 42-30 horizontal spindle machine. A series of parts required two drilled and reamed holes accurately positioned and in line. They had to be drilled and reamed from the outside toward the center. The machine used has two standard outboard spindles and two special inboard spindles. The fixtures handle seven different parts of the same type, interchangeably. Parts are hand fed, automatically clamped, machined and ejected at the rate of 1500 pieces per hour at about 85 per cent efficiency. Another Bodine machine, the standard model 41-20 dial type automatic assembly unit, was shown tooled with two hoppers and transfer devices. It joins two halves of a plastic battery cap after the lower half is drilled for the vent hole. Production is 30 pieces per minute.

Among the new control devices for heavy presses at the Danly Machine Specialties booth were a rotary cam limit switch, a pressure control manifold, and a dual air valve. The rotary switch cams can be adjusted externally, during operation, by setting a thumb screw. The manifold is a composite of five valves and gages for safe pressure control of a gaseous or liquid supply. The dual air valve is designed to prevent accidental stroking due to valve failure. It has two independent pilot operated valves in a single housing. Each valve in the

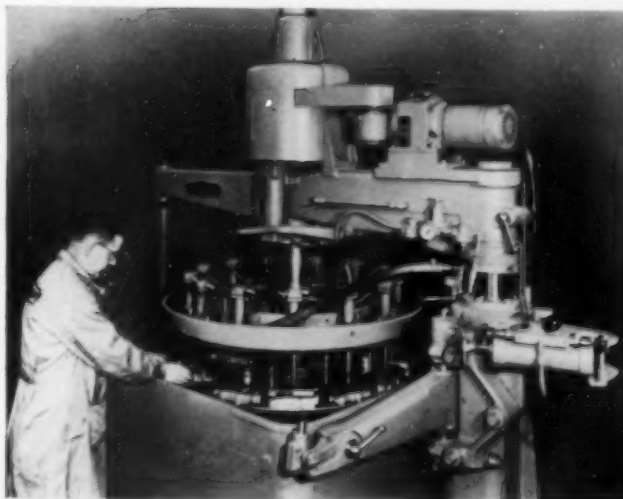


Kearney & Trecker six-station rotary for differential carriers: Station 1, load and unload; 2, rough mill inside bearing surfaces; 3, finish mill inside bearing surfaces; 4, drill three and countersink two holes; 5, finish drill five holes; 6, straddle mill and saw cut pedestal end.

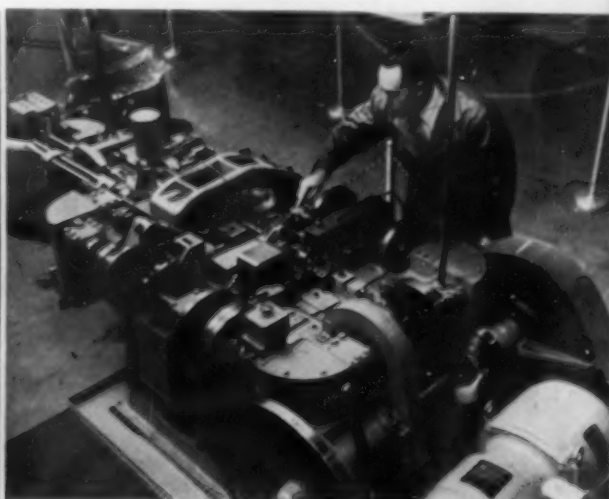
unit is a two position, normally closed type, and either exhaust port will exhaust both valves should one fail.

In addition to the Warner & Swasey machines previously announced, the company showed a new No. 4 ram-type turret lathe with an all-hydraulic headstock. Twenty-four speeds are provided by the constant mesh gear train with one-lever control. Full hydraulic feed also is provided. Capacity is two-in. diameter bar stock.

Vickers Inc. featured a compact package system for



Norton No. 48F Hydrelap high speed lapping machine was shown for first time. For single or parallel face work, it features electrically timed cycle and semi-automatic feed.

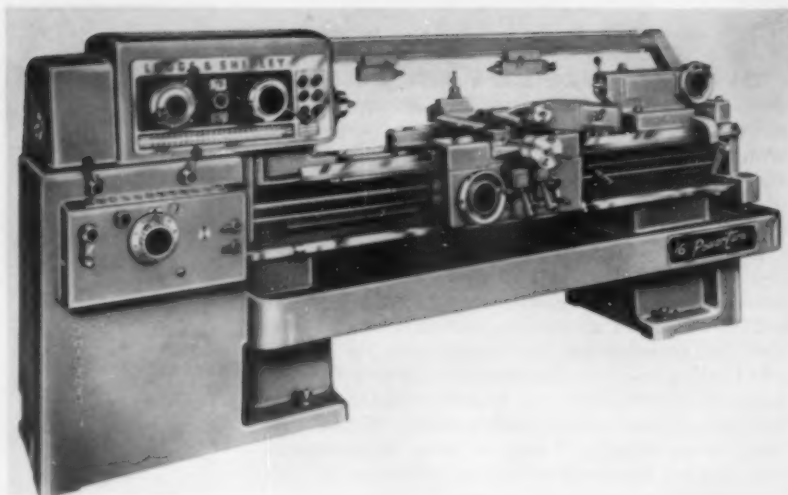


Small formed metal stampings are made from coiled stock on this machine manufactured by the U. S. Tool Co. Tapping of the workpiece is included in the series of operations.

providing hydraulic power and control for clamping, gaging, transferring, roll over, elevating, indexing, and similar operation of low hydraulic horsepower. The system is said to reduce installation and maintenance costs and be extremely flexible. The stand, with a built-in, eight-gallon reservoir and filter, holds a one, 1½ or two-hp motor driving any one of a choice of 1000 psi balanced vane pumps, an optional directional valve, balanced piston relief valve, and manifold panel to eliminate external piping.

Lake Erie Engineering Corp. advanced one of the latest ideas in safety guards for heavy presses. A so-called curtain of light is projected in front of the danger area. When any part of this light is broken, the machine automatically stops. The fail-safe device, made by Electronic Control Corp. of Detroit, is designed for presses that can be stopped during the closing stroke. The beam can be of one or two in. in diameter, or a curtain seven or 12 in. high.

Greenlee Bros. and Co. showed the Hydro-Power precision boring tool for custom applications. The units can be mounted on jigs and multiple station

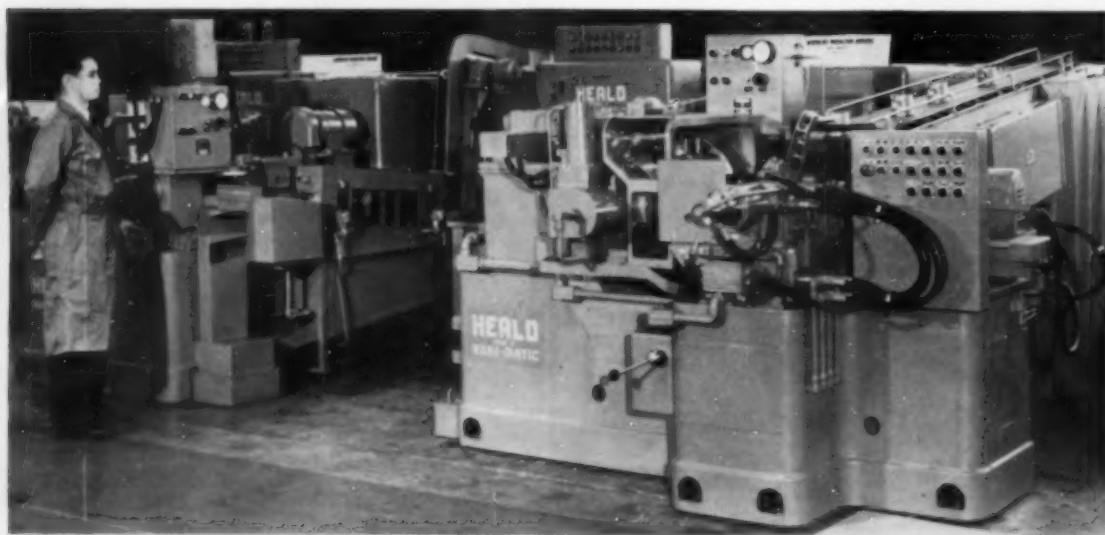


Ledge & Shipley Powerturns 45-deg Copymatic lathe with improved control valve. It was shown producing stepped motor shafts.

machines. The feed principle involves a threaded piston in an oil cylinder. The rotation of the boring shaft and the piston results in a hydraulic feeding action and is said to result in work tolerances within 0.0003 in. and 30 microinches or better in finish.

A spherical Microhoner developed by Micromatic Hone Corp. was being demonstrated on a ½-in. ball on the end of a rod. The adjustable angularity of the head and tool spindle, plus lateral adjustment, controls the generation of the spherical surface.

Among the new machine accessories shown in the
(Turn to page 104, please)



The Heald piston line for boring the wrist pin hole and turning the O.D.

International's New S-Line Trucks



The International S-165 truck-tractor is one of many models in the new S-line. Having a GVW rating of 16,000 lb and gross combination weight rating of 29,000 lb, it is powered by a 140 hp Black Diamond 264 engine.

A NEW series of trucks designated as the S-line, and featuring new styling and new cabs, has been introduced by the motor truck division of International Harvester Co.

The new models include a wide number of four and six-wheel gasoline and LPG-powered units, ranging in gross vehicle weight rating from 4200 to 33,000 lb. Light and medium-duty specializations have been expanded, according to the maker. S-line models range from the light-duty S-100 series through the heavy-duty S-180 series. Included is a new light-duty S-120 (4x4) rated at 7000 lb GVW. In addition to standard models, nine chassis are offered in the multi-stop field, including Metro-Lite bodies made of magnesium alloy, aluminum alloy, and fiber glass reinforced plastic. A new Metro model, the SM-130, rated at 9000 GVW, is being introduced in the multi-stop line-up.

Twenty-three of the S-line conventional four-wheel models, three six wheelers, six cab-forward models, and the S-160 (4x4) are available with LPG engines.

The manufacturer states larger International engines with increased horsepower have been made standard equipment in the new series.

Cabs have been arranged for better visibility,

driver-comfort, ease of control and attractiveness. Windshields are of one-piece curved safety glass. Green-tinted glass is available on an optional basis. A new optional de luxe cab, offered on four-wheel models up through the S-170 series, provides added refinements. Fiber glass heat and sound insulation is another feature.

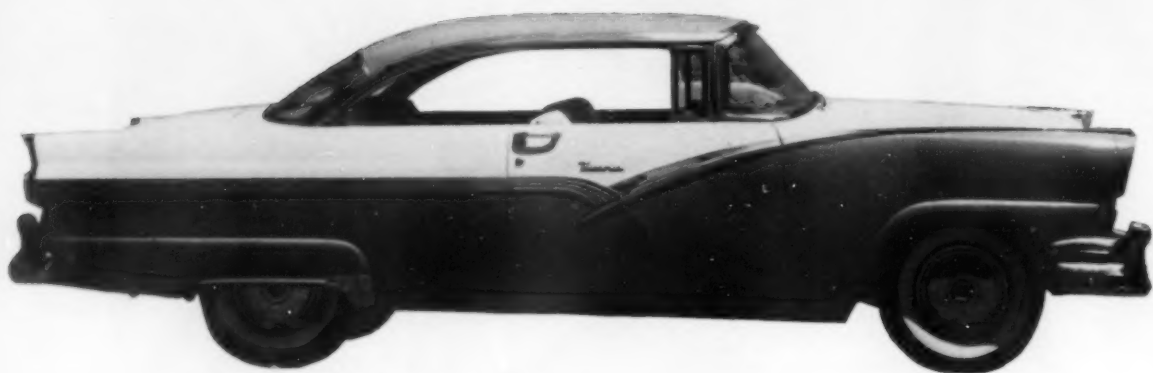
Chassis prices for the new light-duty S-100 through the heavy-duty S-180 truck models range from \$65 to \$150 higher than previous models. The price of one new heavy-duty, 6-wheel truck was increased \$240. The manufacturer points out, however, that in many instances the new models have larger engines and a number of other features as standard equipment which were previously optional at added prices.

The International line also includes the R heavy-duty line, ranging from the model R-185 Roadliner through the large Diesel-powered six-wheel RDF-230-H, and with GVW ratings up to 60,000 lb. The R-line likewise offers increased power, improved cab features, and new color combinations.

Rounding out the line are four and six-wheel cab-over-engine models, and the 400 series. The heavy-duty 400 series comprises gasoline, Diesel, or LPG models ranging up to GVW ratings of 90,000 lb.

FORD FOR '56

Offers Two V-8s and a Six



The Victoria, one of seven models in Ford's Fairlane Series

A GROUP of noteworthy safety features, increased engine horsepower, and lower body silhouettes are major highlights of the Ford line for 1956. In all, Ford will offer 18 body styles in four series, as follows: Fairlane—club sedan, town sedan, Sunliner convertible, Crown Victoria, Crown Victoria Skyliner, and Victoria. Later in the season the company will produce a 4-dr. Victoria as well. The Customline series, consisting of a 2-dr. and 4-dr. sedan, will have a new look with changes in side molding treatment. The Mainline series is composed of a 2-dr. and 4-dr. sedan, and a 2-dr. business sedan. The Station Wagon series has six body styles: a new Parklane 2-dr. 6-pass. sedan; 2-dr. 6-pass. Ranch Wagon and Custom Ranch Wagon; 4-dr. 6-pass. Country Sedan; 4-dr. 8-pass. Country Sedan; 4-dr. 8 pass. Country Squire, the latter with mahogany finished metal panels and wood grained fiberglass exterior moldings.

Wheelbase on all models is 115.5 in. Overall length of passenger cars is 198.5 in.; station wagons—197.6 in. Front tread—58 in.; rear tread—56 in.

Although the three basic engines in the Ford line remain substantially the same in displacement and structural features, compression ratios have been increased and horsepower and torque ratings boosted correspondingly. Condensed mechanical specifications will be found in tabular form. All engines continue to operate with regular fuels.

For 1956 the Thunderbird Y-8 engine is standard on Fairlane and Station Wagon models. It comes equipped with automatic choke and dual exhaust. The 272 cu in. Y-8 engine, standard on Customline and Mainline series, includes automatic choke. In addition,

the I-Block-6 is offered as optional in all models. Each engine is available with Fordomatic drive, overdrive, or standard transmission.

A 12-volt electrical system providing faster engine cranking, a new 30-amp Ford generator, and batteries with 22 per cent more capacity, are standard on all models.

Safety features offered this year include the following: a deep-center safety steering wheel; safety door latches, designed to prevent doors from springing open upon impact; safety rear view mirrors with a special backing to keep glass from falling out if broken. The foregoing are standard equipment. Optional safety features include: seat belts anchored to the car; crash cushioning for instrument panels and sun visors. In addition, the mirror frame and front and rear seat supports have been redesigned to reduce the possibility of coming loose in an accident.

Although the displacement of 1956 engines remains the same, Ford has made many detail improvements to effect increased performance and smoother operation. Breathing has been improved by means of larger passages in heads and manifolding. Precision molding of exhaust valves makes it possible to use an improved alloy, thus enhancing durability. Camshafts, of special alloy, are smaller in diameter and have higher lift.

On engines with single- or two-barrel carburetors, a single vacuum chamber attached to the distributor controls ignition timing. In four-barrel carburetor engines, greatly improved spark response is afforded by the addition of a second diaphragm actuated directly from intake manifold depression.

The running gear has been treated to numerous



Newest member of the Ford car line is this Parklane station wagon, a two-door, six-passenger luxury model

Condensed Mechanical Specifications

1956 FORD PASSENGER CAR ENGINES

(Overhead Valve Type)

	Thunderbird	Y-8	I-6
Type	90-deg Y-8	90-deg Y-8	Inline 6
No. cyl	8	8	6
Bore (in.)	3.75	3.62	3.62
Stroke (in.)	3.30	3.30	3.60
Displacement (cu in.)	292	272	223
Compression ratio	8 to 1 8.4 to 1 (a)	8 to 1 8.4 to 1 (a)	8 to 1
Bhp (max.)	200 202 (a)	173 176 (a)	137
Torque (lb ft) max.	285 289 (a)	250 264 (a)	202
Carburetor	4-bbl	2-bbl	Single

Note: (a) with Fordomatic drive only.

Ford Ups Output Capacity By 250,000 Units Annually

Little letup is seen in the present rate of car production, which is headed for an annual record. Ford has indicated that it will continue to operate all of its plants at the present level and has announced that yearly production capacity has been increased by 250,000, about 15 to 20 per cent above last year.

The Dearborn plant recently went on a two-shift schedule for cars. This followed transfer of its station wagon assemblies to the company's other assembly plants.

The Dearborn plant now will be able to turn out 1040 cars daily, compared with 600 under a one-shift operation. The capacity at Dearborn will be exceeded by three huge new assembly plants at Mahwah, N. J.; Louisville, Ky., and San Jose, Calif.

Speaking at a press preview of the 1956 Ford line, R. S. McNamara, general manager of the Ford Div., forecast that industry sales this year would total between 7.4 million and 7.5 million cars, about 35 per cent over last year. For the first 10 months of the 1955 model year, Ford car and

improvements, including a change in calibration and valving for rear and front shock absorbers to provide a better ride. The rear axle for sedans has been strengthened by the introduction of a housing rear cover of thicker gage steel. In addition, an internal baffle has been added within the housing to provide directed flow lubrication to differential bearings.

Clutches for overdrive and manual shift transmissions have been redesigned to increase torque capacity. Moreover, conventional transmission gears have greater strength.

On all models the brakes have fixed anchor shoes and a single adjustment for lining wear.

Ford also offers many optional features, including: power steering, power brakes, power-operated seats and window lifts. Air conditioning, fresh air heaters, and tinted safety glass also are available. This year Ford offers a signal-seeking radio which selects stations automatically.

• • •

truck sales topped the 1.6 million mark, about 20,000 more units than in any previous 10-month period.

The company did not break down the aforementioned figure into numbers of cars and trucks sold. However, new car registrations for the first seven months of this year show Ford sales totaled more than 884,000 units, against about 816,000 in the same 1954 period.

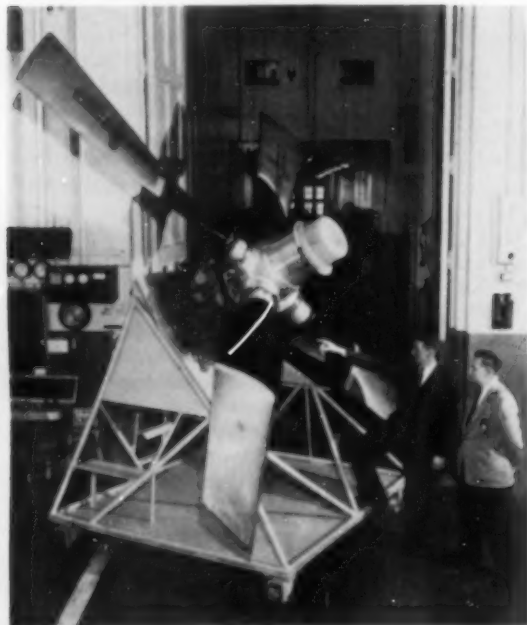
EQUIPMENT

of

ALL TYPES AMASSED

at National Aircraft Show

Continental J69-T-19 gas turbine engine is currently used to power the Cessna T-37 twin-jet Air Force trainer, the Beech L-19-J turboprop liaison aircraft, and the Ryan Q-2 version of the Firebee target drone. It is also scheduled to be the power plant for a counterpart of the twin-jet Morane Saulnier executive plane which Beech Aircraft Corp. expects to build in the U.S.



Sample of this new type Hamilton Standard Turbo-Hydromatic propeller, designed for use on high-powered gas turbine engines was on display at the show. Attached directly to the engine, the propeller derives its efficiency in the different flight ranges through the use of different blade designs.

By Andrew W. Shearer

OVER \$1 billion worth of equipment of all types for both military and commercial applications was displayed at the National Aircraft Show in Philadelphia last month (see AI, September 15, p. 43). The variety of products shown ranged all the way from a dime-sized Westinghouse gyroscope motor to the first mounted cut-away of an Allison T-56 turbo-prop engine.

Engine Exhibits

Highlighting the General Electric exhibit area was a "Power Plant Island," in which were shown a full-scale operating model of the J47 jet engine, small models of other GE jet engines, a rocket engine, and an animated helicopter display. In an adjoining booth, Westinghouse showed a full-size operating model of the J34 axial-flow turbojet.

Pratt & Whitney presented its J57 jet turbine with afterburner and the J48, while Lycoming Div. of Avco Mfg. Corp. showed its extensive series of gas turbines and industrial engines. In addition to its regular line of aircraft parts, the Aircraft Div. of Twin Coach Co. displayed the Fageol Aerojet engine.

Continental Motors Corp. exhibited a Model FSO-

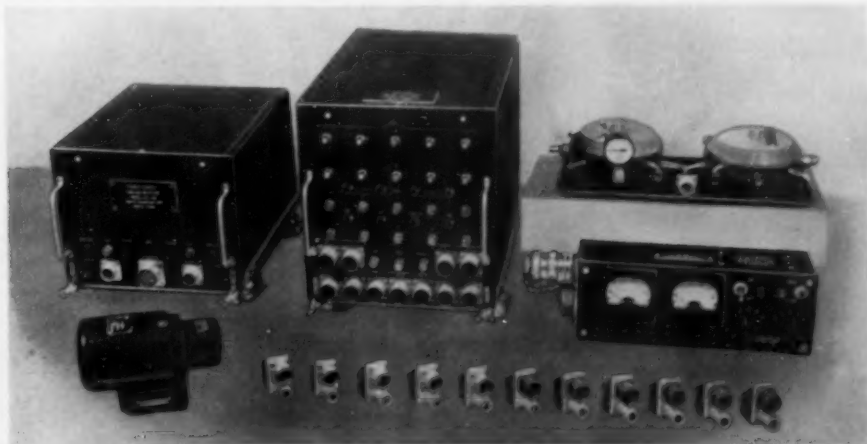


First cut-away full-scale model of the Allison T56 turboprop engine was unveiled at the National Aircraft Show. Weighing only 1645 lb and officially qualified at 3750 eshp, the T56 develops about 2.3 hp for each pound of engine weight.

470-2 fan-cooled and supercharged 260-hp helicopter power plant used in the Cessna CH-1; a Model GSO-526 geared and supercharged 290-hp engine used in the Cessna 620 executive transport; and two of its Packette line, the PE90 and PE150. In addition, Continental Aviation and Engineering Corp., subsidiary of Continental Motors, exhibited two models — the Pimene in cut-away form and the J69-T-19 gas turbine.

This year's National Aircraft Show was selected as the site for the first showing in the East of the Curtiss-Wright J65 jet engine with afterburner. Currently used to power the Lockheed F-104 and Grumman F11F-1 fighters, thrust of this afterburner version is still classified (models in the basic J65 series generate from 7220 to 7800 lb of thrust). Curtiss-Wright also showed its Turbo Compound engine and an electric propeller setup. (Continued on next page)

Model GG/102 Gun Gas Detector, developed by Bristol Engineering Corp., is an electronic instrument for detecting and measuring explosive mixtures of gun gas and air in aircraft gun bays. It is suitable for operation from minus 40C to plus 60C.



Equipment Displays

One of the largest in the entire show, the display presented by Bendix Aviation Corp. included a variety of products that ranged from a tiny atomic radiation detector to a scale-model jet engine with components and control systems. Fifteen of the company's 24 principal divisions were represented to demonstrate its highly diversified manufacturing and research operations.

By way of illustrating its interest in the atomic field, Bendix showed a model of a new nuclear reactor facility and two new atomic instruments for industrial process control—a nuclear density gage and a nuclear liquid level gage. Numerous types of instruments, components, and controls for the aviation field, along with products for the automotive, marine, electronic, and other industries, rounded out a Bendix panorama stretching over nine booths.

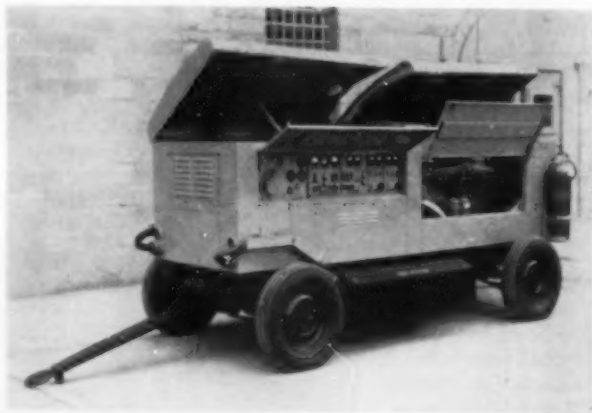
Thompson Products, which also ranked high in the amount of exhibit space occupied, was on hand with a display that included aircraft fuel and booster pumps, valves, switches, mercury castings, permanent mold parts, turbine blades, buckets and shrouds, and miscellaneous jet components. Of particular interest was an automotive-type extruded piston that has been newly adapted for light aircraft engines.

Westinghouse equipment on display included various electrical accessories and systems for missile guidance, flight control, etc., and a new liquid-cooled brushless generator. Ten of General Electric's product departments were represented with exhibits that included aircraft armament systems, flight control, radar and electronic equipment, instruments, accessory turbine systems, and hydraulic drives.

Other manufacturers exhibiting at the show and products displayed included: Du Pont Co., aircraft rivets; Heintz Mfg. Co., sheet metal rivets and components; W. L. Maxson Corp., new electronic equipment and K-4 bombing computer; SKF Industries, Inc., all-purpose bearings; Jack & Heintz,



Jack & Heintz F147 motor generator is one of a series of new high-altitude machines designed for operating up to 50,000 ft; earlier models were limited to 35,000 ft. It is a 2500 va unit designed for 26 to 29-volt, d-c operation to provide continuous 115-volt, 400-c single phase power.



This new trailer-mounted Diesel jet-starting unit was one of several Diesel-electric sets exhibited by Caterpillar Tractor Co. Unit consists of a Caterpillar D318 engine, four generators, and associated switchgear. It is self-propelled from a chain compound drive.

Inc., motor generator, engine starter, and control panel; Western Gear Corp., materials moving device; Kaiser Metal Products, bomber wing sections and electronic equipment;

(Turn to page 114, please)

ADVANCED PRODUCTS REVEALED

at Aircraft Ignition Conference

A HOST of aircraft ignition experts from airlines throughout the world, as well as engine and ignition component manufacturers, and military personnel, were guests at the Second Annual Ignition Conference sponsored by the Scintilla Div. of Bendix Aviation Corp. Held recently in Sidney, N. Y., the conference dealt with problems concerning high and low tension systems on reciprocating engines of the 1830, 2000, 2180, 2800, 3350, and 4360 types.

These meetings have been designed to discuss mutual problems between the users and equipment makers. Naturally, in such a discussion, new engineering ideas are often generated. It was brought out that Scintilla has improved many of its reciprocating engine components since the last conference, but the division is not planning to make any radical changes in ignition parts design. There was a feeling among the airline engineers in attendance that the larger size reciprocating engines are on their way out and that the airlines will be going to gas turbines. Of course, this procedure will take a number of years considering what the operating companies have tied up in equipment investment. Such a course of action for Scintilla would only mean a production capacity change, since the division already supplies complete ignition systems for gas turbine engines as well as the reciprocating types.

Scintilla took the opportunity during the conference to talk about its new Scinseal moldings and flexible tubing for leads and harnesses, and to seal braided conduit. The new material is basically a polyvinyl chloride formulation. Scinseal can be converted to a tough, rubbery film by heating from 300 to 350 F, according to Bendix. The company states that some forms of Scinseal may be adequately fused as low as

1955 IGNITION COMPONENT DATA CHART
for R-2800 Aircraft Engine (More than 5 Aircraft)

No. Aircraft	Ignition System		Ignition Delays Per 1000 Hrs.	Removal Rate Per 1000 Engine Hours					
	High Tension			Wing.	Dist.	L. T. Coil	H. T. Coil	Ign. Sec.	Radio Filter
	Free Wire Harness	Filled Harness							
75	Yes	Yes	Yes	3.80	0.000	0.04	3.30	0.104	0.000
20	Yes	Yes	Yes	0.045	0.012	0.002	0.0001		
7	Yes	Yes	Yes	0.142	0.010	0.000	0.001		
7	Yes	Yes	Yes	3.30	0.10	1.10		0.00	0.00
23	Yes	Yes	Yes	3.00	0.000	1.00	2.04	0.000	0.004
11	Yes	Yes	Yes	1.00					
11	Yes	Yes	Yes	3.00	0.70	1.01	40.0		
7	Yes	Yes	Yes	0.03	0.00	0.04	10.01		
60	Yes	Yes	Yes	0.75	0.00	0.00	0.00		
50	Yes	Yes	Yes	2.00	0.40	2.00	0.30	0.00	
26	Yes	Yes	Yes	3.00	0.00	3.10	30.0		
9	Yes	Yes	Yes	0.33	0.00		2.00	0.04	
10	Yes	Yes	Yes	2.00	0.20	1.00	2.00		
12	Yes	Yes	Yes	0.000	0.000	0.040			
35	Yes	Yes	Yes	1.20	0.10	1.00		0.20	
6	Yes	Yes	Yes	1.43	0.10	1.47	0.20		
3	Yes	Yes	Yes	0.017	0.00				
6	Yes	Yes	Yes	1.0	2.0				
26	Yes	Yes	Yes	1.30	0.00	2.20	0.00	0.0	
21	Yes	Yes	Yes	0.70	0.00	2.00		0.10	
6	Yes	Yes	Yes	1.12	0.14	1.00	0.14		
44	Yes	Yes	Yes	3.00	0.20	3.00	1.20		
14	Yes	Yes	Yes	0.000	2.137				
6	Yes	Yes	Yes	1.00	0.00	0.00			

R-3350 Aircraft Engine

28	Yes	Yes	Yes	2.00	0.000	3.41	3.00	0.001	0.144
10	Yes	Yes	Yes	0.150	0.004	0.070	0.00		0.000
7	Yes	Yes	Yes	2.00	0.200	1.00	1.71		
6	Yes	Yes	Yes	2.00	4.00				
32	Yes	Yes	Yes	0.77	0.13	0.004		0.04	
20	Yes	Yes	Yes	0.22	0.00	2.00	10.01		
10	Yes	Yes	Yes	1.32	0.27	1.01	2.00		
30	Yes	Yes	Yes	0.00	0.17	1.01	1.07	0.00	
10	Yes	Yes	Yes	0.30	0.00	0.30	0.00		
13	Yes	Yes	Yes	0.40	0.01	0.50	0.00		
10	Yes	Yes	Yes	0.07	0.17	0.00	0.00		
9	Yes	Yes	Yes	0.13	0.00	3.74	10.01		
17	Yes	Yes	Yes	0.32	0.10	1.00	0.00	0.00	
12	Yes	Yes	Yes	0.00	0.00	1.00	2.40		
10	Yes	Yes	Yes	2.00	0.20	2.40	1.74		
10	Yes	Yes	Yes	0.00	0.04	1.00	1.00		

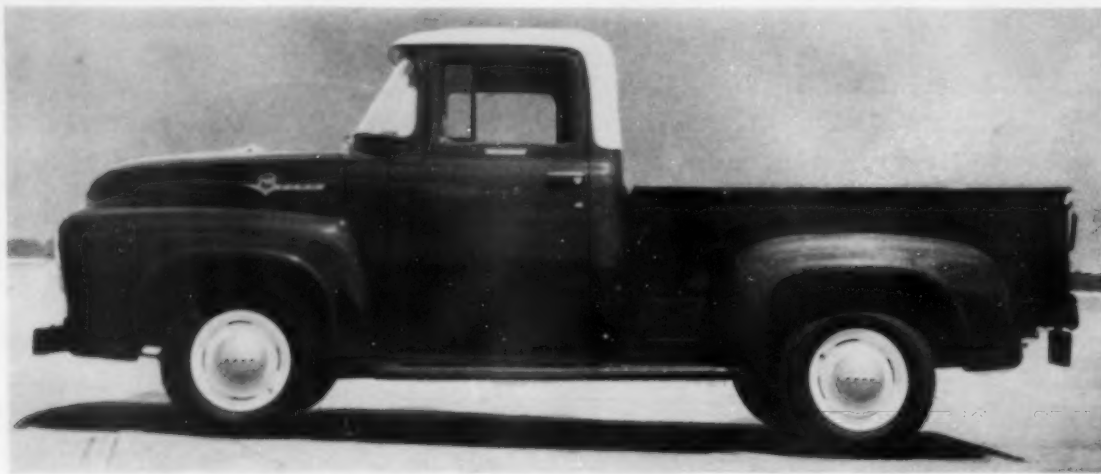
Prepared by Scintilla Division from Data Submitted by the Individual Airlines for the Ignition Conference.

250 F while others may require temperatures nearer to 400 F. The duration of the heating cycle depends on the thickness of the film.

Scintilla is using its new material to provide sealed metal conduit for high tension leads, and in making harnesses and leads for various applications where cost, weight, and simplicity are important factors.

Bendix Scintilla personnel also brought out that the company is using Teflon covered wire and silicone impregnated materials for some aircraft ignition items.

Ford's Truck Engines Increased in Power for '56



Ford's F-100 pickup truck with wraparound windshield and hooded roof is available in a 110 or 118 in. wheelbase to carry either a 45 or 65 cu ft box. Powered by a 223 cu in. I-block six cylinder engine rated at 133 hp, or a 272 cu in. Y-8 rated at 167 hp, the pickup has five transmissions available: standard, overdrive, Fordomatic and heavy duty 3 speed and 4 speed.

THE 1956 Ford truck line, which includes two new models — a T-750 tandem axle model in the heavy truck series and a new pickup with longer wheelbase — was described in the Sept. 15 issue of AI, page 38.

Presented here in tabular form are the basic specifications of Ford's truck engines for 1956.

Horsepower has been increased in all engines, by 12.7 per cent in the smallest 223 cu in. six cylinder engine rated at 133 hp to 17.6 per cent in the largest 332 cu in. heavy duty Y-8 engine rated at 200 hp when equipped with a four barrel carburetor.

BASIC FORD TRUCK ENGINE SPECIFICATIONS

Engine	Displacement (cu in.)	Bore (in.)	Stroke (in.)	Compression Ratio	Horsepower (@ rpm)	Torque (@ rpm)
Cost Cutter Six	223	3.62	3.60	7.8	133 @ 4000	202 @ 18-2000
Power King Y-8	272	3.68	3.30	7.8	167 @ 4400	280 @ 21-2800
Heavy Duty Power King Y-8	272	3.68	3.30	7.6	158 @ 3800**	247 @ 20-2800
Heavy Duty Power King Special Y-8*	272	3.68	3.30	7.6	168 @ 3800**	259 @ 21-2900
Cargo King Y-8	302	3.82	3.66	7.5	175 @ 3800**	279 @ 20-2900
Cargo King Special Y-8*	302	3.82	3.66	7.5	186 @ 3800**	288 @ 21-2700
Torque King Y-8	332	3.80	3.66	7.5	190 @ 3800**	306 @ 20-2800
Torque King Special Y-8*	332	3.80	3.66	7.5	200 @ 3800**	316 @ 21-2700

* Equipped with a four barrel carburetor.

** Governed engine speed.

Ten Companies Share in New Air Force Contracts

Two General Motors divisions have been awarded Air Force contracts totaling nearly \$56 million. Allison Div., under its contract, will produce \$53.7 million worth of T-56 turboprop aircraft engines, while A C Spark Plug will manufacture bombing navigational computers valued at \$2.1 million.

In addition, awards totaling more

than \$1 billion were made to eight other companies. They include Boeing Aircraft Co.; Goodyear Engineering Corp.; General Dynamics Corp.; Philco Corp.; Collins Radio Co.; Western Electric Co.; Radio Receptor Co.; and General Cable Corp.

Canadian Automotive Production Sets New Mark for First Half

Canadian automotive production in the first six months of 1955 hit a new

record. All told, 231,644 passenger cars and 49,068 trucks, were turned out, compared to 196,994 passenger cars and 48,874 trucks in the first half of 1954.

General Motors produced 101,393 passenger cars, up 21,978 units over the first half of last year. Ford produced 87,185 passenger cars, compared with 96,462 in the first half of 1954, despite the strike which tied its plants up in January.

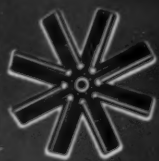


Specialists for over 37 Years in
FLUID FLOW
AND
VIBRATION PROBLEMS

Schwitzer has extensive Research and Engineering facilities and experienced technicians to develop an economical product—for the Flow of Air, Oil, Water and other Fluids—or the Isolation or Elimination of Vibration in your equipment, whether it is in the Automotive, Atomic, Aircraft, Agricultural, Earth Moving, or other fields.

Schwitzer utilizes the most modern production facilities for the Fabrication, Assembly and Testing of these Precision Products—for high or low volume production.

These services are available to you for product development applications in many diversified fields.



Fans



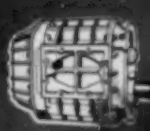
Dampers



Water Pumps



Turbochargers



Superchargers



Oil Pumps

SCHWITZER
CUMMINS COMPANY
INDIANAPOLIS, INDIANA



Are there any bargains in abrasives?

There certainly are. But in the abrasive field, as in many others, underselling is often a warning signal of under-par value and service.

Whenever the cut-price bait seems tempting, it's a good idea to consider what Norton offers you — in both grinding wheels and service.

You can be sure of top quality and top performance with every Norton product, because the most advanced research, engineering and manufacturing facilities in the entire abrasive field have already made sure.

For the same reasons, you can count on the consistent uniformity of Norton products. Your repeat orders for wheels of the same specifications

will be filled with exact duplicates of the wheels you used before.

And filled fast! Because Norton maintains huge warehouse stocks, both regular and special, near to you. That means not only prompt, regular deliveries, but extra-fast emergency service. And Norton Abrasive Engineers, located in your area, are always ready to give you expert aid in any grinding problem.

Those are the reasons why Norton grinding wheels are your real, money-saving bargains — why they bring you the "Touch of Gold" in grinding — the Norton extra that adds product-value and cuts cost every time it goes to work for you. Remember: only Norton offers you such long experience in both grinding wheels and grinding machines to help you produce more at lower cost.

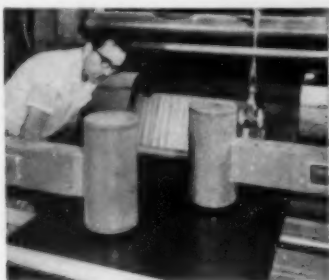
W-1831



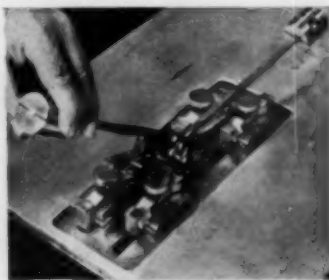
*Making better products...
to make your products better*

and its BEHR-MANNING division

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes



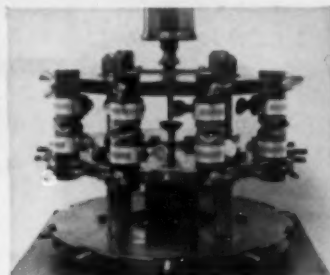
UNIFORMITY of weight and thickness of "Fairprene" diaphragm material is assured by beta ray testing. Thickness of the coatings is constantly controlled to meet the most exacting requirements.



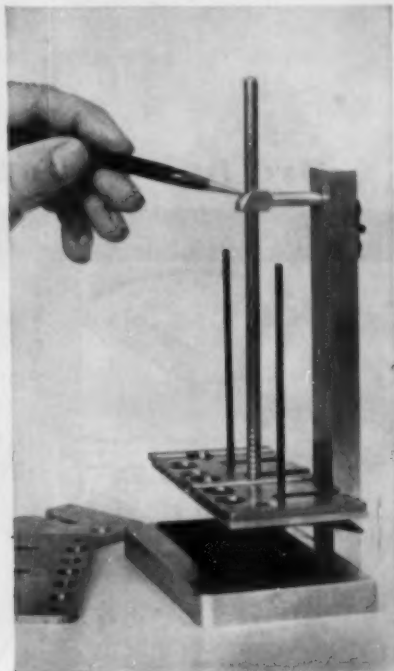
SCRUB RESISTANCE of "Fairprene" diaphragm material is demonstrated by scrub test. Coating compound is securely bonded to fabric... is virtually unaffected by constant flexing and friction.



POROSITY of diaphragms of "Fairprene" to gases is tested by subjecting diaphragms to high air pressure under water. Absence of air bubbles indicates extreme pressures withstood by "Fairprene" coated fabrics.



FLEX RESISTANCE is shown by this flexibility test. Vibrator telescopes years of active service into hours, yet after this rugged treatment "Fairprene" diaphragm material shows no evidence of cracking.



CONTROLLED SENSITIVITY is measured by "S-Fold Pliability Test." Immersion in oils and aromatic fuels followed by testing at extremes of temperature demonstrates the control of pliability of diaphragms made with Du Pont "Fairprene."

For seals, gaskets, diaphragms— Du Pont Fairprene® products pass the test!

Automotive engineers are taking a close look at Du Pont "Fairprene" coated fabrics for use as resilient parts—and with good reason!

Diaphragms, seals and gaskets of "Fairprene" show exceptional resistance to the deteriorating effects of oil products—gasoline, kerosene, oil and grease. They resist abrasion and permanent distortion, remain smooth and flexible. Lightweight "Fairprene" products give years of service despite temperature extremes and have excellent burst and tear strength...

exceptional resistance to loss of coating.

Though "Fairprene" products are now used as seals, gaskets and diaphragms, they can be effectively employed in many other automotive parts.

It will pay you to investigate possible new uses for "Fairprene" coated fabrics in your design. Du Pont engineers will gladly work with you in developing special grades of "Fairprene" to meet your own specifications. For further information, just clip and mail the coupon.

"Fairprene" is Du Pont's trade-mark for coated fabrics, sheet stocks and cements.

DU PONT INDUSTRIAL COATED FABRICS

E. I. du Pont de Nemours & Company (Inc.)
Fairfield, Conn.



BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

Mail coupon for further information...

E. I. du Pont de Nemours & Co. (Inc.)
Fabrics Division, A-510, Fairfield, Conn.

I am interested in "Fairprene" Industrial Products.

() Have a representative call.

() Send booklet "Coated Fabrics for Diaphragms."

Name _____ Title _____

Firm _____

Address _____

City _____ State _____



3rd in a Series...

OF HIGH PRODUCTION CASE HISTORIES

ASK



BAIRD

ABOUT IT

Forging hand-loaded chuck with crank pin end out . . . indexed to work station to turn and chamfer pin, face shoulder, cut relief for grinding.

**TURNING BOTH ENDS
OF A CRANKSHAFT
FORGING . . .**

**IN ONE CONTINUOUS
OPERATION . . .**

**ECCENTRICITY LIMIT
OF SHAFTS .001"**

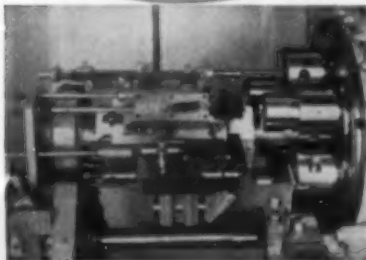
**PRODUCTION
151 PIECES
PER HOUR**

The Baird 76H Automatic Chucking Machine is set up for double indexing with alternate chucks (6-7 inch) arranged to receive the shafts for (first) operating on the crank pin end and (second) operating on the long shaft end.

Also provided are a relieving motion mechanism to cut relief for grinding on pin end . . . a 3-to-1 reducing motion for center drilling . . . and a live center attachment to support the long shaft end while turning.

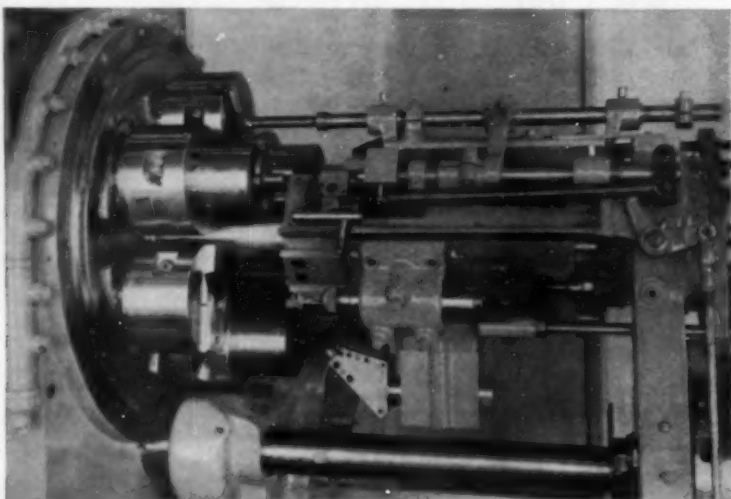
This is indeed automatic high production . . . the type of machine and tooling that can put many a manufacturer in a favorable competitive position. If you have similar parts to produce, "Ask Baird about it!" Write to Dept. AI.

On return to feeding station, work is removed and placed in adjacent chuck, long shaft end out . . . indexed to work stations to drill center in shaft end, long shaft turned and chamfered, shoulder faced, relief-cut for grinding.



ABOVE: Rear view of tooling set-up.

RIGHT: Front view of tooling set-up.



THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS
ON THESE ESSENTIAL PRODUCTION PROBLEMS:

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & DISK METAL
FORMING MACHINES • AUTOMATIC FINISH • TURNING, GRINDING

TRADE



EATON Free-Valves LAST LONGER*

Free Floating Action—

- Wipes stem and seat free of deposits
- Keeps a film of oil on stem and guide surfaces
- Prevents scuffing
- Prevents burning and guttering
- Reduces wear
- Eliminates hot spots due to local leakage



Performance records covering engines of all types in all kinds of service prove that Eaton Free-Valves increase valve life many times over the ordinary life expectancy of conventional valves.

Eaton Free-Valves can be applied to engines of all types and sizes, without costly design changes. Our engineers will be glad to discuss Eaton Free-Valves with you.



EATON

— VALVE DIVISION —
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN
General Offices: CLEVELAND, OHIO



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamic Drives, Brakes, Dynamometers



MECHANICAL SEAMLESS

ELECTRIC-WELDED

AIRCRAFT SEAMLESS

AIRCRAFT MECHANICAL

FABRICATING
and FORGING

Ostuco Tubing Specialists have vast application experience in *your* industry. This storehouse of design and production know-how can improve your product and trim costs too.

Ostuco's *single-source* service is convenient and error-free. See your nearest Ostuco Tubing Engineer or write direct for the answer to *your* tubing problem.



OSTUCO TUBING

SEAMLESS AND ELECTRIC WELDED STEEL TUBING
—Fabricating and Forging

OHIO SEAMLESS TUBE DIVISION
of Copperweld Steel Company • **SHELBY, OHIO**

Birthplace of the Seamless Steel Tube Industry in America

SALES OFFICES: BIRMINGHAM • CHARLOTTE • CHICAGO (Oak Park)

CLEVELAND • DAYTON • DENVER • DETROIT (Ferndale)

HOUSTON • LOS ANGELES (Beverly Hills) LOUISVILLE

MOBILE • NEW YORK • NORTH KANSAS CITY

PHILADELPHIA • PITTSBURGH • RICHMOND • ROCHESTER

ST. LOUIS • ST. PAUL • SEATTLE • TULSA • WICHITA

CANADA, RAILWAY & POWER ENGR. CORP., LTD.

EXPORT: COPPERWELD STEEL INTERNATIONAL COMPANY

317 Liberty Street, New York 6, New York

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Orders and Inquiries
Run High As Machine
Tool Show Closes.
Feature This Year
Was the Number of
Financial Men In At-
tendance

Happenings Around the Tool Show

Exhibitors at the Machine Tool Show in Chicago last month displayed broad smiles at the end of the two arduous weeks. Never before have so many people come to a show with just a single purpose in mind—to buy new machines for the production that is required in our expanding economy.

One machine tool executive stated that his company had more than doubled its backlog. Another claimed that orders were taken through 1956 production and well into 1957.

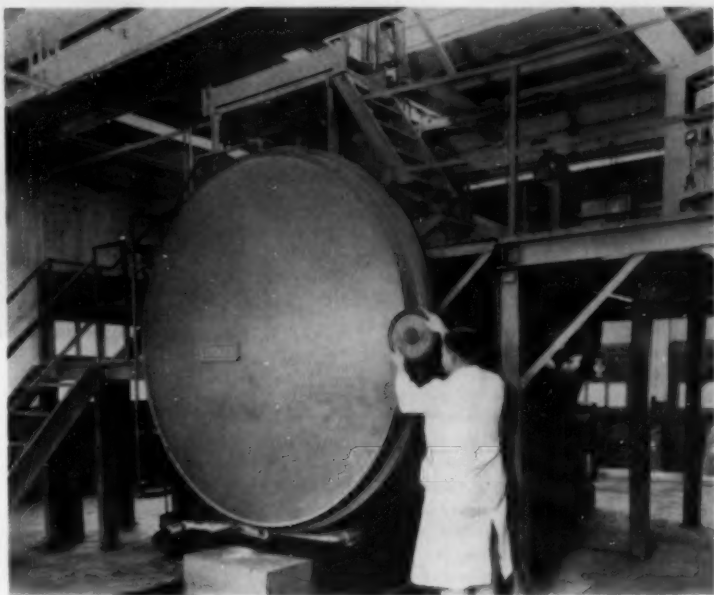
In most cases machines leaving the Show will be sent back to the builders' plants only to leave again for customers' plants. Every exhibitor we spoke with was extremely pleased with the gilt-edge orders and inquiries that rolled in during the two hectic weeks.

Manufacturers have been so anxious to obtain new equipment in recent months that one machine tool company had to drop from the show. This company was to display machine tools already purchased and at the last minute the customer stated that the tools were needed for immediate production.

On one small bar automatic approximately 100 orders were taken. An executive from Mexico came to the show with several certified checks. Most, if not all, of the checks are now in the hands of machine tool builders.

The chairman of the Show, William E. Rutz, executive vice-president of Giddings & Lewis, summed up the show as follows:

"Perhaps no other industrial exposition in history has had the advance planning which has gone into the Machine Tool Show; never before has the Machine Tool Industry invested record millions to make this show history's greatest demonstration of the ability of modern methods and



F. J. Stokes Machine Co., Inc., recently installed this 200-lb capacity vacuum furnace at the Thompson Products research laboratory in Cleveland.

equipment to lower metal-working's cost and dramatically boost its productivity.

"The attendance has really been remarkable, I think. It was composed chiefly of works managers, plant superintendents, production experts, research engineers, men engaged in product development, vice presidents in charge of operation, and other people directly concerned with the question of productivity.

"It was also attended by a very fair sprinkling of top company executives and financial men, who may have little technical knowledge, but who are the people whose approval is required for the okaying of replacement and modernization programs. This is extremely important, because in visiting our Show these men actually saw demonstrated the potential savings

which their production men had been telling them about, but which they didn't really believe until they saw it with their own eyes."

Rutz Comments Before GE Sales Group

During the Show Mr. Rutz spoke before the General Electric Sales Group. In addition to giving a rundown on the proceedings at the Show, he made some very interesting comments about the electrical industry and machine tools. Again, we would like to quote Mr. Rutz.

"We keep on trying to sell machine tools and you keep on trying to promote the sale of motors and controls—and if we don't watch ourselves, both of us, we'll be talking more about

electronics, automation, better feeds and unloading devices, better gears, better mechanical this and that—and trying to make a sale on that basis.

"What the customer wants is money saved. What he wants is increased productivity that can be reflected in increased profits. All of our improvements in machine tool models and all of your improvements in motors and electronic controls, are designed exactly for this purpose.

"Therefore, in our selling, let's be sure that we stress the end result—which is more production and money saved—instead of stressing the technical and mechanical means by which this objective is accomplished.

"The finest technical improvement in any machine tool, control panel or motor is of no consequence to the potential buyer unless it results in money saved."

On the matter of how the electrical industry contributes to further progress in machine productivity, Mr. Rutz commented on some of the more interesting developments which are currently coming into the machine tool field.

(1) The development and use of closed loop television gives the machine tool builder a good tool for the remote control of dangerous operations and the chance to concentrate the visual inspection of many operations in a small area where this visual comprehension can give the operator complete control of a complex machine system. In large transfer machines this will be quite valuable.

(2) The continued development of relay type feedback loops will give the machine tool builder an aid in the accurate control of automatic machinery.

(3) In close relationship with particular items, the use of magnetic tape as a machine control master instruction source with the assured accuracy coming from relay feedback loops, gives us the possibility of getting one step closer to the future dream of the automatic factory.

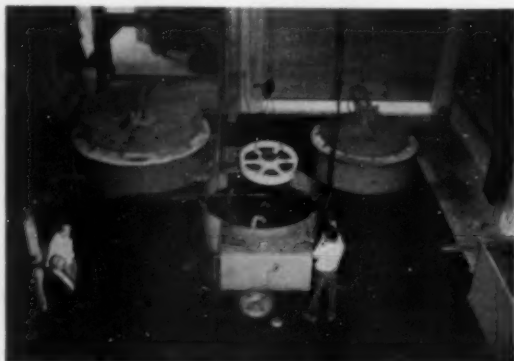
(4) The application of some of the new techniques using transistors and other newly developed electronic equipment by the electrical industry makes it possible to give the machine tool builder a compact electronic control for machine tools. This compactness feature has been greatly needed in the past as we are all acquainted with the instances where the machine tool control has taken on such huge proportions as to dwarf the machine which it controls. Simply from the space saving problem in the valuable

factory area occupied by machine tools, this improvement in control size is a must.

Plant Tours

The DoAll Co., Des Plaines, Ill., held "open house" for Machine Tool Show visitors featuring a Machinorama. It offered a personalized tour of demonstrations showing newly developed simplified methods for automatic contour and power cut-off band machining, automatic production surface grinding and precision gaging

Pittsburgh Gear Co., a subsidiary of Brad Foote Gear Works, recently had installed new heat treating equipment capable of handling parts up to six ft in diameter, up to six ft long, and up to 8500 lb. The new equipment includes a radiant tube pit-type gas carburizing furnace.



systems that permit the assembly of gage blocks into everyday shop inspection tools. The contour sawing demonstrations featured new concepts in faster cutting and easy fixturing for production shaping, slotting, notching and angular parting operations. Power cut-off sawing operations featured their new automatic power saw and Demon high speed steel blade, a combination for setting new standards of lower cost per unit of cut. In one demonstration, five-in. diameter rounds of 1020 CR steel were cut at 90 sec per cut or at a rate of 40 pieces per hour. Also demonstrated was the automatic indexing and nesting of material for multiple cut-off sawing operations.

A small "spectacular" in itself, the "Forgerama" of Kropp Forge Co. drew a healthy crowd of production executives during the two show weeks. Tents erected on the firm's Chicago property displayed a variety of forged products made by Kropp for the aircraft, automotive, agricultural and railroad industries. Parts included jet engine blades, aircraft landing gear and structural components, huge locomotive parts for the wheel trucks, and titanium pieces. Over 30 Kropp customers contributed to the show. Visitors toured the shops and saw the new \$6 million hammer shop recently completed as an adjunct

to the Air Force press program.

Dreis & Krump Manufacturing Co., Chicago, also conducted an open house and machine exhibit at its plant. Besides a tour through the different buildings showing the manufacture and assembly of the various machines, over 6000 sq. ft. of floor space was devoted to an operating exhibit of the complete line of Chicago press brakes, SS presses, hand and power bending brakes, and folder brakes. In addition to an advanced design of smaller press brakes, one

SS press with large die area was set up for a multiple punching and notching operation, and a press was set up for completely automatic production of sprocket chain-form coiled stock to produce chain without scrap.

Die Casters' Annual

Greatly increased acceptance of die castings in all phases of American industry was reflected in production figures released by David Laine, executive secretary of the American Die Casting Institute. Speaking at the die casters' Annual Meeting held in Chicago during the Tool Show, Mr. Laine revealed solid gains in consumption of both zinc and aluminum die castings in widely diversified areas of industry.

Based on figures for the first half of 1955, Mr. Laine's findings revealed that consumption of zinc die castings in all phases of American industry will be in excess of 325,000 tons this year. In the case of aluminum—whose growth as a die casting metal has been phenomenal in the last few years—a total of 185,000 tons is expected to be consumed by the end of 1955.

Institute spokesmen pointed out that these sharply increased requirements for both zinc and aluminum have made the question of metal mar-

(Turn to page 104, please)

NEW**PRODUCTION
and PLANT****EQUIPMENT**

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Spring Rod Ends Pointed Automatically

STANDARD heating furnace and roll forging press equipment is used with automatic handling devices to preheat and point the ends of 12-ft long, $\frac{3}{4}$ -in. diameter coil spring rod blanks. The machine receives bundles of coil spring rod stock on a conveyor, feeds the rods at a controlled rate through a furnace to heat the ends to 1900F and conveys them one at a time to a reciprocator mechanism. This reciprocator feeds the rods into the cam-operated roll forging machine three times, thus forging the rod end to a taper-pointed shape concentric with the rod and putting the part number on the rod.

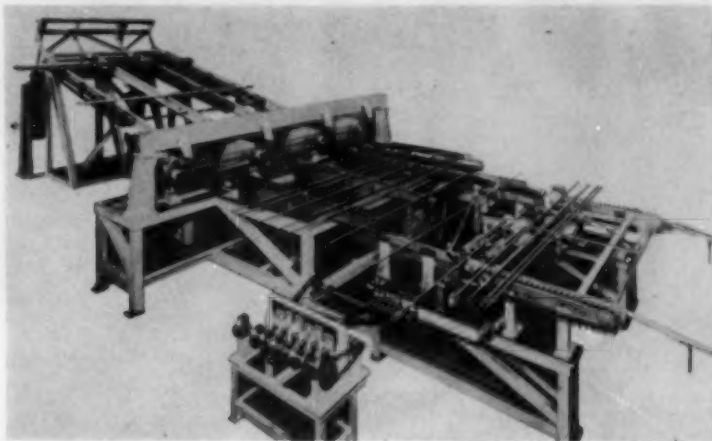
From the forging press, the rods are delivered to a chain conveyor where they are cooled at a controlled rate and directed to another cradle which conveys loads of rods to the spring coiler.

All operations of the rod pointing automation unit are either operated or controlled by the forging press. The single operator controls only the incoming and outgoing coil cradle conveyors. Where cranes are available, incoming and outgoing conveyors are not required in the automation setup.

The forging press squeeze dies were redesigned and repositioned directly in front of and in line with the forging rolls. This enables the rods to be reciprocated in and out of the forging press in one plane, and also permits the part number to be put on the part by including a coining die in the squeeze die.

Air cylinder controls are utilized throughout the machine to avoid high temperature operating problems. An in-process gaging unit positions the rods axially for the roll forging operation to assure uniform pointing regardless of rod length variations.

A bundle of coil spring rod stock is delivered to the automation machine in a cradle. This cradle is mounted on a conveyor dolly which brings the



Expert automation unit that enables a standard heating furnace and roll forging press to point and mark 618 coil spring rod blanks per hour.

rods from the stockroom to the machine. Two hydraulic cylinders dump the load of rods onto an inclined ramp where they flow to a selector plate mechanism under the control of a motorized chain conveyor arrangement.

An air-cylinder controlled selector plate mechanism feeds one rod at a time to a rotary feed device. Both hydraulic dump cylinders and the selector plate mechanism operation are controlled by the amount of rod fill in the inclined ramp.

The rotary feed is timed with a helical screw conveyor and delivers one rod to the conveyor in each axial thread space. The screw conveyor feeds the rods with their ends in the furnace at a controlled rate.

An air cylinder controlled straight-line feed delivers a rod to the pointer feed reciprocator mechanism where it is clamped by a diaphragm air cylinder. An air cylinder controlled paddle gage mounted on the roll forging press positions the rod in the jaws in correct relation to the upset end. Another air cylinder feeds the rod back and forth into the roll forging and

squeeze dies as the operation progresses.

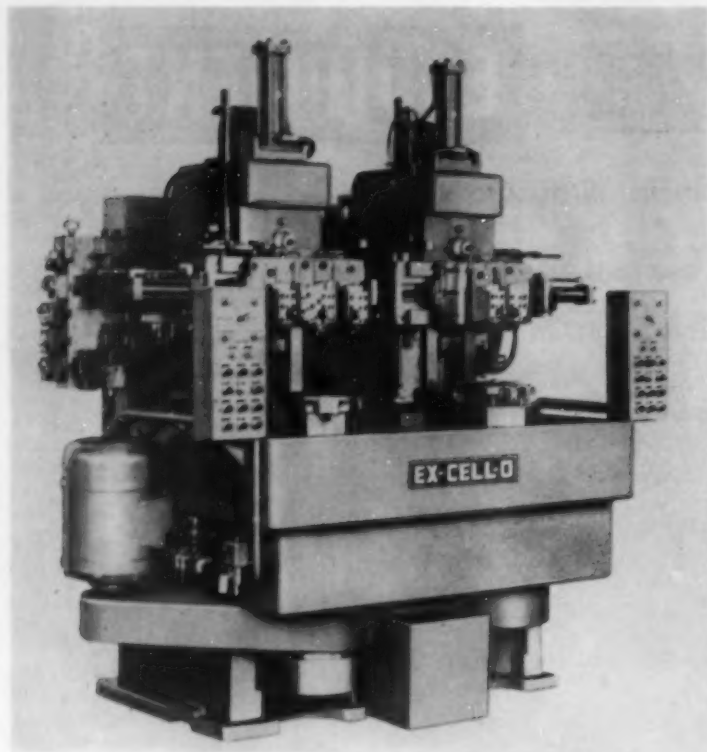
In the pointing operation the rod is fed into the forging rolls and retracted to a stationary position where the end is squeezed by the air-cylinder controlled squeeze die that lines up with the forging rolls. This operation is repeated three times. In the last squeezing operation, the rod end is lifted in the stationary squeezing die position by an auxiliary air cylinder to a position where the part number is coined in the part.

Finished rods are deposited by an air-motor controlled rotary cam mechanism on a cooling chain-type conveyor. This conveyor directs the rods to another cradle that is conveyed to the spring coiling machine when the cradle is sufficiently loaded.

A control console operated by the forging press has cam operated valves that sequence all air cylinder control functions. Seven revolutions of the roll forging machine actually produce one finish pointed and marked rod.

Expert Automation Machine Co.

Circle 21 on postcard for more data



Ex-Cell-O flexible vertical machine features ease of setup and high productivity.

Two Operations on Two Parts

COMPLETING two sides of a part simultaneously on two different parts simultaneously is possible on the style 432 vertical precision boring machine. It will perform such operations as turning, boring, facing, grooving and chamfering in combinations or as separate operations.

Each of two stations has a separate hydraulic system, counterweighted compound tool slide, vertical spindle, drive equipment and controls. During the machining operations at one station the other station can be unloaded, loaded and started on its automatic cycle. Individual controls and power equipment at each station prevent the operation of one station affecting the other.

Vertical construction provides convenience in loading and unloading work and adjusting or changing tools. The spindle shafts are hollow to permit drawbar or pneumatic chuck operation. The machine base is designed for easy chip disposal. Spindle speeds are easily changed with V-belt and

pulley combinations. The desired machine cycles are obtained by positioning selector switches, adjustable dogs and orifices. *Ex-Cell-O Corp.*

Circle 22 on postcard for more data

Deburring Compound

A MILDLY acidic compound for barrel deburring, descaling, and derusting, FM 184, was designed to replace raw acids in barrel operations, where alkaline materials and abrasives are impractical because of time limitations. It is also said to improve color of steel after alkaline deburring; to remove heat scale from steel; and to brighten brass, either with or without the use of abrasive media. The compound is said to have good foaming properties at the recommended concentrations of one to three oz to the gallon of water. It may be added dry to the burnishing barrel. *Oakite Products, Inc.*

Circle 23 on postcard for more data

Resin Hose

USE of a specially designed hydraulic hose made of a fluoro-carbon type resin instead of conventional rubber materials, solved a production testing problem for a large contract manufacturer. Sundstrand Aviation manufactures hydraulic constant speed drives for driving constant frequency alternators. These drives must be tested prior to shipment and also upon overhaul. For this purpose, the company has developed special test stands for use in the plant as well as for sale to customers. During tests, MIL-O-7808 synthetic hydraulic fluid is circulated at temperatures up to 250 F for production tests and up to 350 F for experimental testing. Known as R500, the hose used can withstand temperatures up to 450 F and is unaffected by all oils and fuels. It reportedly does not stiffen even after prolonged contact with fluids at 450 F, and retains flexibility at temperatures down to minus 100 F. The hose is supplied with a jacket of stainless steel armor braid.

Together with special stainless steel fittings that can be swaged over the hose armor, the hose assembly is rated at 1000 psi working pressure. *Resinflex Corp.*

Circle 24 on postcard for more data

Loader



Designed to handle short bars, studs, etc. up to six in. long, this unit takes the parts from the magazine, elevates them to the desired height and presents them for feeding. Delivery rate can be varied from one to 12 pieces per minute. It can be modified to suit individual requirements. *(Feedall, Inc.)*

Circle 25 on postcard for more data

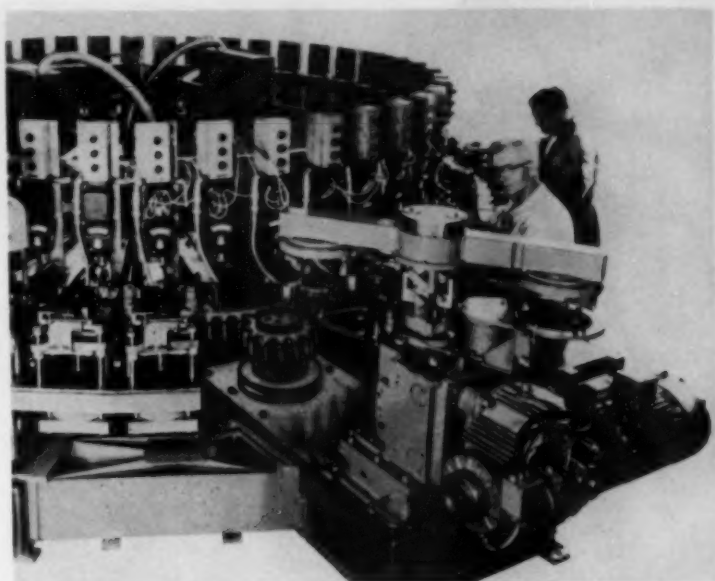
Swinging Loader for Dial Machines

By providing a geared power take-off on a standard swinging arm machine loader, a single unit can load, unload and index a dial table. The combined unit was first developed to unload and rotate a table that is 16 ft in diameter and weighs over 15 tons. The mechanism indexes the 42 station table in two seconds and at the same time unloads a finished part from the table to an outgoing conveyor.

The unloading action is performed by two horizontal arms that are carried on a vertical shaft. Spring closed work clamps mounted on the end of each arm are so arranged as to slip over and grip a workpiece when brought down on it at the unload station. Then the arms lift and rotate through 180 deg, bringing the workpiece to a position over the outgoing conveyor where the arms lower and the clamp presses against a fixture that releases the workpiece into the conveyor. While one arm is releasing its workpiece the other arm is picking up another workpiece. The dial table is indexed by the same motion that rotates the arms.

The mechanism may be equipped with various gear ratios to provide any number of indexes per revolution, and the clamps may be designed to handle a wide variety of workpieces. By providing two spaced lamps on each arm the mechanism can be adapted to both load and unload the table.

The basic mechanism of the loader-index is the maker's standard cam ac-



Hautau automatic loader for dial machines, with cutaway view of the geared power take-off.

tuated box. It is powered by an electric motor that drives through an electric clutch, an electric brake and a geared speed reducer. The clutch and brake are provided so that the unit may be started and stopped at any point in an automatic cycle upon receiving a signal from the other machines.

The shapes of the cams are derived from cycloidal functions so that the table is indexed and the parts are unloaded in a minimum of time with

negligible jerk. The cams drive a pair of slides that move over hardened and ground shafts on preloaded ball bushings. One slide actuates the vertical motion of the arms and the other rotates the arms and the index table.

This model of the Hautau loader floor mounts on a heavy steel base that requires a floor space of 2½ by 3 ft. Other loader models are available in a wide range of sizes and features. Hautau Engineering Co.

Circle 26 on postcard for more data

Delay Relay

An electrical interlock in a circuit which allows push button control can now be obtained with an instant action auxiliary switch in a new model Agastat time delay relay. Model NEL is for operation on energization. Time delay is pneumatically-controlled and provides a readily adjusted and accurate timing interval from 0.1 second to 10 or more minutes.

Contacts of a normally closed double-throw Micro-Switch are kept in open position by a lever connecting the auxiliary switch and the core of the relay. When the relay coil is energized, the core jumps up and these contacts close instantly allowing interlock. Simultaneously the time delay

period starts and continues to the pre-adjusted time delay at which the main switch trips transferring contacts. In de-energization, auxiliary switch contacts change to open position and the main contacts transfer. A'G'A Div., Elastic Stop Nut Corp. of America.

Circle 27 on postcard for more data

Collet Closer

An air-controlled collet closer is designed to replace hand levers and hand wheel in opening and closing collets on engine and turret lathes of one-in. bar stock capacity. A stationary oil-resistant innertube is inflated by air to operate the collet-closing mechanism. The need for rings, pistons, and packings is eliminated.

Finger tip or foot control of the collet closer is provided. Heat is rapidly dissipated through fins to prevent overheating. All load is carried by two thrust and radial load bearings. Wilson Air Collet Closer, Inc.

Circle 28 on postcard for more data



Wilson Collet Closer



Blais gap frame die tryout press with hydraulic action

Gap-Hydraulic Die Tryout Press

DEVELOPED for die tryout and pilot production runs, a new hydraulic press combines the best features of hydraulic action and gap frame construction. Precise control over inching permits close observation of die action. Full tonnage is available at any point in the stroke. The stroke itself is longer than that for standard inclinable presses and compensates for die space and press set-up adjust-

ments, which facilitates die tryouts and pilot runs.

Frames conform to standard inclinable press specifications, including arrangements for inclining. All models are built to receive standard press accessories and Blais-Marquette die cushions, and are available in capacities ranging from 50 to 250 tons. E. W. Blais Co.

Circle 39 on postcard for more data

Protective Coating

HIGHLY polished chromium and stainless steel auto parts are protected in shipment by a new strippable spray coating based on Bakelite vinyl resins. It handles decorative interior and exterior metal moldings formerly shipped in paper tubing. A mechanized system enables two men to spray coat up to 1500 pieces per hour for service parts handling. About 40 of these parts, measuring anywhere from six to 96 in. long and from 1/4 to 12 in. wide, could be packed per man-hour in paper tubing. The new system is based on the ability to spray with a durable coating about 0.01 in. thick, while the parts move on the cables that form

the feed conveyor. Angled spray nozzles cover each part with a protective film. Shallow trays under the spray recover excess plastisol for reuse. Varying the angle at which parts are placed on the endless moving cables accommodates parts up to 80 in. in length on equipment that measures eight ft wide and 35 ft long. Banks of infra-red lamps cure the sprayed on plastisol to an elastic film in an oven operated at 325 F. The cost of the strippable coating is estimated at approximately 2.6 cents per sq ft. These coatings can also be dip or flow-coated on metal parts and applied hot or cold. Dennis Chemical Co.

Circle 30 on postcard for more data

Synchronous Motors

THE new synchronous inductor motors, self-starting and reversible without gears, have been announced. Available in 20- and 54-frame sizes, the low speed motors accelerate to synchronous speed in 1/4 cycle or less, and the permanent magnet rotor stops within seven deg with moderate external inertia.

The 54-frame motor, with a torque rating of 75 oz-in., is designed for use on motor-operated valves and rheostats, industrial process timers, and recording devices. Other applications include operation of cams and levers, replacement of solenoids, machine tool traverse feed drives, and defense applications.

Torque rating of the 20-frame motor is two oz-in. at 100 rpm. It is designed principally for application on higher torque timing devices, viscosity measuring equipment and higher torque time measuring and sequence timers. Both motors are of three lead designs reversible by a single-pole double-throw switch. The motors start, stop, and reverse very rapidly and will withstand stalling without overheating.

Designated type SMY, the 20-frame motor is available at 100 rpm in the 60-c, 115-v rating and at correspondingly reduced speeds on 50 and 25 c. The 54-frame is available at 75 rpm for 60, 50 and 25 c at both 115 and 230 v. General Electric Co.

Circle 31 on postcard for more data

Stock Straighteners

MOTORIZED stock straighteners are available with compact, one unit drives having either constant or variable speeds. Models are manufactured in a variety of sizes to make stock in widths from 2 1/2 to 12 in. and with either five, seven or nine straightening rolls. All models are available as pedestal units and those taking stock widths from six in. and up may be had as cabinet units at no extra cost.

These straighteners are mercury switch controlled and have a forward and reverse switch. They come equipped with an adjustable counter-balanced free loop arm. Units may be operated intermittently for feeding coil stock or continuously for straightening short lengths of stock.

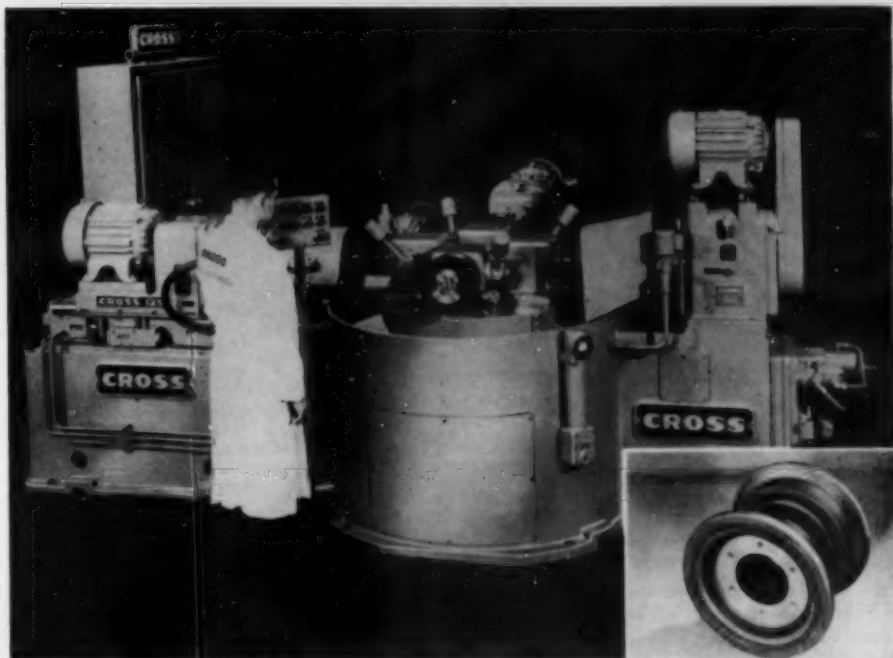
Heavy duty units taking stock up to 24 in. in width are also available. Cooper Weymouth, Inc.

Circle 32 on postcard for more data

Drills, Chamfers, Taps Tractor Wheels

This dial-type machine incorporates a four-station power-operated index table for six holes on two sides of tractor wheels. Production is 54.5 pieces per hour at 100 per cent efficiency. Fluid motor drive is provided for indexing. The unit also has individual lead screw feed for tapping and gravity-operated cam clamping. (Cross Co.)

Circle 33 on postcard for more data



Strain Gage System

THIS system is designed to register very minute deflections, due to stress or strain, in structural parts or assemblies of an aircraft on a continuous monitoring basis. Visual and/or recorded data is possible for registration.

The system consists of a potentiometer, servo motor, gear train, indicator, comparator, amplifier, and a transmitting synchro. Inputs of 10 to 50 millivolts display full scale readings on the dial of the indicator. Inherent electrical noise in the system is below 20 microvolts.

The equipment is designed for the use of two comparators of different types. One adaption is the position of a potentiometer as a per cent of full potentiometer range. In addition, the system registers the output of a 350-ohm strain gage bridge as a per cent of full scale force input. Provisions are incorporated to permit zero adjustment of the system.

Deviation of the system from a straight line does not exceed 0.2 per cent full scale. Minimum readable increment of motion is within 0.2 per cent of full scale, which is defined as the resolution of the system. The over-

all accuracy of the system is less than one per cent under all conditions and repeatability within 0.2 per cent of full scale. The equipment has been de-

signed to meet military specifications for airborne equipment. Greenleaf Mfg. Co.

Circle 34 on postcard for more data

Versatile Horizontal Grinder

TWO new horizontal grinders, for general utility work, have just been announced. Designed for all classes of grinding work from accurate grinding using a tool post holder to heavier work using four or six-in. organic wheels, these new grinders are offered in five speeds. They feature a built-in muffler which has no external parts to increase tool body diameter. Available with $\frac{1}{2}$ -in., 24 and $\frac{1}{2}$ -in. 13 spindle, both models are designed for fast, easy servicing; tools can be completely

disassembled without using any special tools.

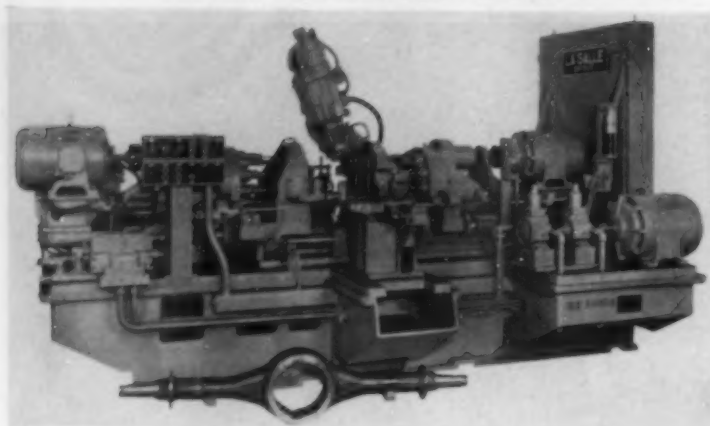
These new Buckeye grinders are equipped with C series air motors. Capacities range from 2½ by ½-in. organic wheel to 4 by ½-in. vitreous wheel on the ½-in. spindle model, and from 2½ by 1 in. to 6 by ½-in. organic wheel on the ½-in. spindle model. Either type of tool can be adapted to use with wire brushes or roll abrasives. Buckeye Tools Corp.

Circle 35 on postcard for more data



Utility grinder may be used with tool post holder.

Six Different Housings Handled



Direct gage settings are all that are required to process each of six different housings on this machine, without additional locators. Endwise location is taken from the flange, vertical location from the bearing diameters. Unit drills 10 holes on each side and one vent hole. (LaSalle Tool, Inc.)

Circle 36 on postcard for more data

Coolant Transfer

A LINE of high pressure coolant transfers for gun drilling introduce coolant under high pressure through a hollow drill. Holes can be drilled with conventional drill press equipment to close tolerances and high finishes. Type DA units combine a one-piece-spindle with a transfer housing and are used to convert present vertical drilling equipment to the new gun drilling techniques which require high speeds and high coolant pressures. Double Sealol seals and ball bearing construction are features.



Gun drill coolant transfer

These adapter units are normally furnished with a specified Morse taper shank for attachment to the drill press spindle and a specified straightbore socket to accept the gun drill. Speeds to 10,000 rpm and pressures to 1000 psi are acceptable to these units. Sealol Corp.

Circle 37 on postcard for more data

Radio System

A LOW-POWER industrial two-way radio system has been designed for materials-handling vehicles. Known as Carfone-150, the system incorporates both mobile units and base station equipment, with three-watt input, for operation over the 148-to-174 megacycle band. The mobile unit can be mounted horizontally or vertically, is available for operation on either six or 12-volt motor-driven vehicles or higher voltage electric trucks. It measures six in. high, 15 in. wide, and 17 1/4 in. deep. The base station equipment combines the mobile transmitter-receiver chassis with an a-c supply.

The equipment features sectionalized chassis construction, with transmitter, receiver, and power supply designed as separate independent units and assembled in a single case; capability of 0.001 per cent frequency stability without ovens; and a tamper-proof i-f filter pretuned at the factory. Radio Corp. of America.

Circle 38 on postcard for more data

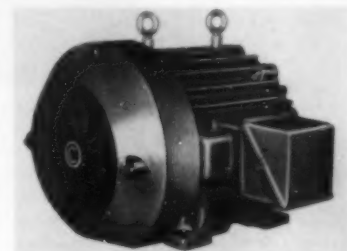
Booster Cylinder

FLUID pressure to 1951 psi is built up in an air and oil booster cylinder using an input pressure of 100 psi. This new cylinder will develop a ratio of 19.7. Its five-in. air cylinder drives a 1 1/4 in. hydraulic ram which in turn delivers 0.994 cu in. per inch of stroke. The cylinder return is accomplished by air action. It reportedly can maintain pressure indefinitely. No special hydraulic pumps, relief valves, reservoirs and special piping are said to be needed. Other sizes can be produced to comply with specific requirements. Air-matic Valve, Inc.

Circle 39 on postcard for more data

Motor Line

PRODUCTION of rerated totally enclosed fan cooled motors in the 7 1/2 to 100-hp series is announced. In addition to meeting all NEMA requirements, the line has such features as:



Century 50-hp TEFC motor

Six layer insulation for the stator windings using plastic coated wire; a ventilated fan providing the same efficiency of cooling when operated in either direction; rib type cast iron frame construction; rotor balancing. Century Electric Co.

Circle 40 on postcard for more data

Recording Tachometer

AN indicating and recording tachometer has a large dial for reading at a distance. An eight-in circular chart makes a 12 or 24-hr record. For logging machine operating time, the type 317 tachometer has a centrifugal governor which is independent of temperature change or magnetic influence, according to the specifications. Belt drive is recommended, but any direct drive method may be used. Amthor Testing Instrument Co.

Circle 41 on postcard for more data

Sheet Lifter

AN eight-cup vacuum roll-over sheet lifter can handle sheets of any non-porous material up to five ft wide by 20 ft long weighing 2000 lb with a 7 to 1 safety factor. The lifter is equipped with a U-hook for attaching to an overhead crane. Lifting of the sheets is accomplished by vacuum produced by two pumps. The vacuum is conveyed by tubes through a storage tank.

The unique feature of the lifter is its ability to roll the sheet 180 deg. Sheet or plate when inverted can be carried with complete safety and without dependence upon vacuum. Rotation may be stopped at any angle from horizontal making inspection of both sides of sheet simple and easy. *F. J. Littell Machine Co.*

Circle 42 on postcard for more data

Dial Snap Gages

ANEW line of dial snap gages are designed to give a direct reading from the measuring anvil to the indicator. There are no bearings, levers, shafts or cams. Parallel anvils are tipped with solid cemented-carbide to provide long service life. Precision adjustments of the upper anvil by means of a fine pitch ground thread attachment can be made within a $\frac{1}{4}$ in. range. The entire construction is completely shockproof. The indicators are encased in a housing to protect them from damage. Ten standard models are supplied in sizes up to 2.500 in. Larger models and special types are manufactured to customers' specifications. *Lincoln Park Industries, Inc.*

Circle 43 on postcard for more data

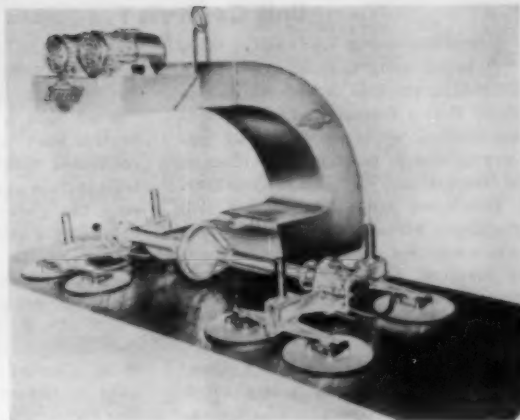
Carbide Blanks

THROW-AWAY blanks, both precision and utility, and additional one-end types of the new steel cutting grades 350 and 370 carbides as well as of standard grades for nonferrous machining are announced. The line covers all ranges of machining from light finishing to extreme heavy roughing. The new blanks are made ready-for-use on standard mechanical tool holders currently in use.

Nine basic sizes with different radii in triangular, round and square shapes are included in the line. Basic sizes are being made available off-the-shelf in different thicknesses. *Carbology Dept., General Electric Co.*

Circle 44 on postcard for more data

Littell sheet lifter can rotate sheets for stacking or inspection.



Sound Analyzer

THIRD Octave Spectrum Analyzer Model B L-2109 is now being distributed in the U. S. A. and Canada. Through the use of a narrow frequency band analysis, it provides physical measurement data that is said to be easily correlated to subjective tests for loudness of sound or the intensity of vibration. The analyzer works in the range of frequencies from 35 to 18,000 C. Through the use of 27 fixed one-third octave band filters with the associated low noise-high gain amplifiers the instrument affords either manual or automatic switching. Data can be read from a meter or graphically recorded through a connection to a level recorder. *Brush Electronics Co.*

Circle 45 on postcard for more data

Special Riveter

PRODUCTION has started on model G-39 ACV automatic riveter for fuel tight riveting using "slug" headless type rivets. Using headless type rivets, the machine operates on a continuous, automatic cycle. It clamps the work piece rigidly under pressure, then drills, countersinks, or counterbores as required. Next it inserts a slug rivet in the hole and forms a head on the lower side of the work. Then it squeezes, or vibrates, a head on the upper side of the work, tightly filling the hole and cavity. Lastly the machine mills the upper head of the rivet flush with the skin.

All operations such as drill feed and speed, clamping pressure, rivet head height, milling height, and return stroke are adjustable. Either slugs or rivets may be fed from multiple container hoppers and inserted

into the workpiece. The multiple hopper and quickly changeable anvils (dies) provides for rapid change from one rivet head type, length, and diameter to another. *General Riveters, Inc.*

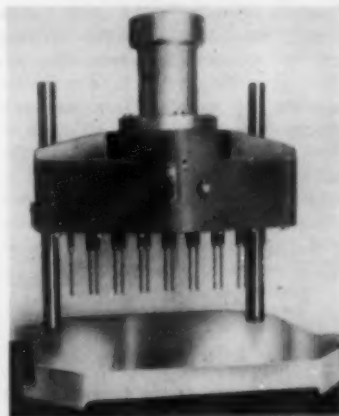
Circle 46 on postcard for more data

Gearless Drill

IN-LINE drill heads have been added to a line of standard gearless drill heads. The new series is for drilling, tapping or reaming holes in a straight line in an elongated pattern. In the original series, patterned hole drilling has been emphasized. As with other heads, any diameter in any machinable material as close as the sum of the two smallest hole diameters can be drilled, reamed or tapped.

The capacities of the new series are holes arranged in a straight line 13, 15, and 26 in. long. Drill sizes are $\frac{1}{8}$ to $\frac{3}{4}$ in. *Zagar Tool, Inc.*

Circle 47 on postcard for more data



In-line gearless drill head

Unit Controls Feed Rate

A SELF-CONTAINED hydraulic resistance unit, the Hydro-Check DCP-50A, controls movement so precisely that a pre-set feed rate will be maintained with virtually 100 per cent accuracy, unaffected by changes in temperature, load and air pressure.

Developed primarily for use with the firm's air motors in applications where extreme accuracy of movement is required, the unit features automatic flow and thermal compensation. A liquid-filled metallic bellows constantly corrects the flow control valve in accordance with changes in hydraulic oil temperature. An upstream flow control regulator compensates for variations in load and fluctuations in air

line pressure. A sintered metal filter is incorporated to break up any minute residual air bubbles in the fluid.

Feed rate is varied by turning a control knob which is stamped with calibrated markings. Optional controls include auxiliary valves for stopping the piston rod at any desired point in the power stroke and for interrupting the control to permit uncontrolled movement through any fractional part of the power stroke. The device is available in standard stroke lengths of 2, 4, 6, 9, 12, 15, or 18 in. Control may be on either forward or retract stroke, or both. *Bel-lows Co.*

Circle 48 on postcard for more data



Bellows Hydro-Check hydraulic resistance unit for controlling movement of air-powered slides.

Tack Cloth

EXCEPTIONAL tackiness imparted by a unique formula is a major claim of a new tack cloth now being offered. Used in wood and metal wiping applications when high quality finishes are to be applied, the Tac-All tack cloth is said to remove all foreign dust and grit particles. The tack substance used to impregnate the cloth resists drying indefinitely and offers no danger of spontaneous combustion, according to the maker. It is non-reactive on any metal surface including magnesium. In principle, all dirt and dust particles are absorbed into the cloth by the tack substance after a single pass with the cloth rather than remaining on the surface to clog holes and create abrasive hazards. *George W. Renner Co.*

Circle 49 on postcard for more data

Alloy Fluxes

AGGLOMERATED fluxes for automatic submerged arc welding of low alloy steels are claimed to be a new

approach to the problems of welding complex and highly specialized steels. The alloy flux is individually compounded for each job. These special fluxes contain alloying elements which may be changed as required by the particular job for which the flux is made. They can be used with a mild steel electrode and will produce a low-alloy deposit which can be readily varied to meet specific requirements.

The fluxes available can be compounded to produce weld metal containing the following elements in varying amounts: chromium, molybdenum, vanadium and nickel. They can be used for welding the steels classified as low alloy, which is generally accepted as steel containing less than six per cent alloy. The fluxes are used on the newer highly complex high-strength alloy steels and armor steels. They can be used to produce an alloy deposit that will respond to heat treatment in order to produce the same hardness or tensile strength of the heat-treated plate. Another application is the addition of alloys to the weld through the flux when an alloy

electrode is used, yet additional alloy is needed to control dilution.

Adding alloys to the weld deposit through the flux rather than through the wire is said to have several advantages. The process of manufacturing permits precise control of flux analysis economically and quickly in either large or small quantities. This is not always true in the case of alloy wire. A further advantage is the ability to make small changes in deposit analysis through welding procedure control without changing either the flux or wire composition.

By blending basic alloy fluxes in varying proportions with each other, the company will produce automatic submerged arc welding fluxes to individual customer requirements. The basic fluxes are stocked, and after the job analysis determines the weld deposit requirements, a flux can be created without delay to meet the specific requirements. *Lincoln Electric Co.*

Circle 50 on postcard for more data

Shelving

STEEL shelving units that hold up to 300 lb per shelf are said to simplify stocking and inventory control, and provide safe, neat, easily accessible storage for tools, parts, supplies, and hundreds of other items. The units can be spotted individually around the plant, or joined together at the sides or back to form large storage areas. Each shelf is adjustable at one-in. intervals. The finish is a tough baked-on black enamel. The units are six ft tall, three ft wide, 12 or 18 in. deep, weight 44 lb. *S. A. Hirsch Mfg. Co.*

Circle 51 on postcard for more data



Hirsch low-cost shelves

Free

INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Airflex Riveter

1

Bulletin 86P covering their rotating impact spinner-riveter hand gun and other models of the all-pneumatic Airflex portable series is offered by Lemert Engineering Co.

Carbide Blanks

2

Information on standard carbide blanks for clamp-on style tools, solid carbide on-end inserts, round and square inserts, and triangular and square throw-away insert blanks is given in eight-page catalog GT-292. Carboloy Dept., General Electric Co.

Machining Aluminum

3

Data and tooling information on the production of aluminum parts on automatic screw machines is described in detail in a 52-page booklet. Illustrations show proper tool angles for machining the various aluminum alloys. Tables cover speeds and feeds for cutting, skiving, cut-off, drilling, reaming, boring, counterboring and trepanning, recessing, box tools and hollow mills, threading, thread rolling, cross slide knurling and turret knurling. Kaiser Aluminum & Chemical Sales, Inc.

Dry Fluid Drive

4

Bulletin A-640 shows two methods of selection and dimensional drawings of the Flexidyne dry fluid drive and coupling, explanation of the flow charge (the dry fluid), and the thermal protecting unit. Dodge Mfg. Corp.

Hydraulic Items

5

A 56-page illustrated catalog describing the complete line of oil-hydraulic devices for general industrial application is now available. It includes engineering, design and application information relating to pumps, pressure controls, volume controls, directional controls, control assemblies, hydraulic motors, transmissions, cylinders and hydraulic accessories. Vickers, Inc.

Converters

6

A four-page brochure on torque converter combinations and their adaptability to industrial, agricultural and marine use explains the improved performance possible by the addition of torque converter combinations. Long Manufacturing Div., Borg-Warner Corp.

Silicone Rubber

7

Silastic silicone rubber is discussed in a folder detailing properties and performance as affected by extreme temperatures, weathering, compression, chemicals and dielectric service. Dow Corning Corp.

Controlled Boring

8

Details of the punched card program direction on the Schwartzkopf KBF2 self-locating precision boring machine is fully described in a new catalog. Marac Machinery Corp.

(Please turn page)

10/1/55

VOID After Dec. 1, 1955

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

FIRST CLASS
Permit No. 36
(Sec. 36.9 P.L.B.)
New York, N. Y.

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES

P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

NAME (Please Print)

COMPANY OR BUSINESS

ADDRESS

(No. & STREET)

(CITY)

(ZONE)

(STATE)

AUTOMOTIVE INDUSTRIES

POSTAGE WILL BE PAID BY

P. O. Box 66,

Village Station,

New York 14, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United StatesFIRST CLASS
Permit No. 36
(Sec. 14.9 P.L.R.)
New York, N. Y.

Induction Heating 9

Motor generator control and heating stations used in conjunction with motor generator equipment of either 960, 3000 or 9600 cycles and ranging in power output from 50 to 1250 kw for high frequency heating has been issued by *Lindberg Engineering Co.*

Structure Test 10

A portable radiant heat unit for aircraft structural testing uses 162 quartz infrared heat lamps capable of producing approximately a 20 F per second heat rise on certain aircraft skin surfaces. Project Digest No. PD-19. *Cook Electric Co.*

Socket Screw Data 11

A Handy Data File contains complete information on seven types of socket screws plus hex-socket keys with regard to dimension standards, standard sizes, physical properties, recommended tightening torque, and suggested applications and uses. *Mac-it Screw Div., Strong Carlisle & Hammond Co.*

Spot Welder 12

Bulletin 334-3 describes the type PMCO 2 ST air operated, press type, three-phase Modu-Wave spot welder for aircraft and general industrial use. *Sciaky Bros., Inc.*

Pinion Finisher 13

A production hypoid pinion deburring and chamfering machine, recent addition to its Burr-Master line, is described in Bulletin 103-100 available from *Modern Industrial Engineering Co.*

Air-Line Lubricators 14

The lubricators described in bulletin 4169 are made in sizes for use with the smallest hand-held air tools to the largest quarry-type drills. Sizes range from ¼ pint to 12 quarts. *Ingersoll-Rand Co.*

Balancing Machine 15

The Electodyne system for automatically measuring the amount and indicating the angular location of unbalance by means of electronics, is comprehensively described in Bulletin 49, which also features the complete line of dynamic and static balancing machines, including the horizontal and vertical models as well as the automatic crankshaft balancer. *Tinius Olsen Testing Machine Co.*

Gear Making 16

A portrayal of gear making, with many close-up photographic views of operations reproduced in multi-color, is presented in a new 44-page brochure commemorating the 50th anniversary of *Sier-Bath Gear & Pump Co.*

Optical Tooling 17

A catalog describing optical tooling instruments and accessories for checking and alignment of machines includes many new items not heretofore available to help simplify the task of checking straightness of ways, parallel bars, angle blocks, angular relationship between bed and spindle axis, etc., and for alignment of machinery such as lathes, millers, jig borers, drill presses, spar mills, skin mills, and transformatic and automatic machines and aircraft jigs and fixtures. *Farrand Optical Co.*

Estimating Brass 18

An easy-to-use table for estimating the weight of high-speed free-cutting brass rod required for screw machine products fabrication features columns for "pounds per 1000 pieces per inch" for round, square and hexagon rod in all commonly used diameters from 1/16 to 3½-in., as well as the figures for "pounds per linear foot." Also given are weight conversion factors for 28 other popular copper-base alloys. *Scovill Manufacturing Co., Mill Products Div.*

U-Joints 19

Availability of a new Almetal universal joint and drive shaft brochure is announced. The new brochure discusses the advantages of the company's line of exclusively designed needle bearing universal joints and shows design principles. *Detroit Bevel Gear Co.*

Circle code numbers below for Free Literature, New Plant Equipment,
or New Product Information

VOID After Dec. 1, 1955

10/1/55

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

NAME

(Please Print)

TITLE

COMPANY OR BUSINESS

ADDRESS

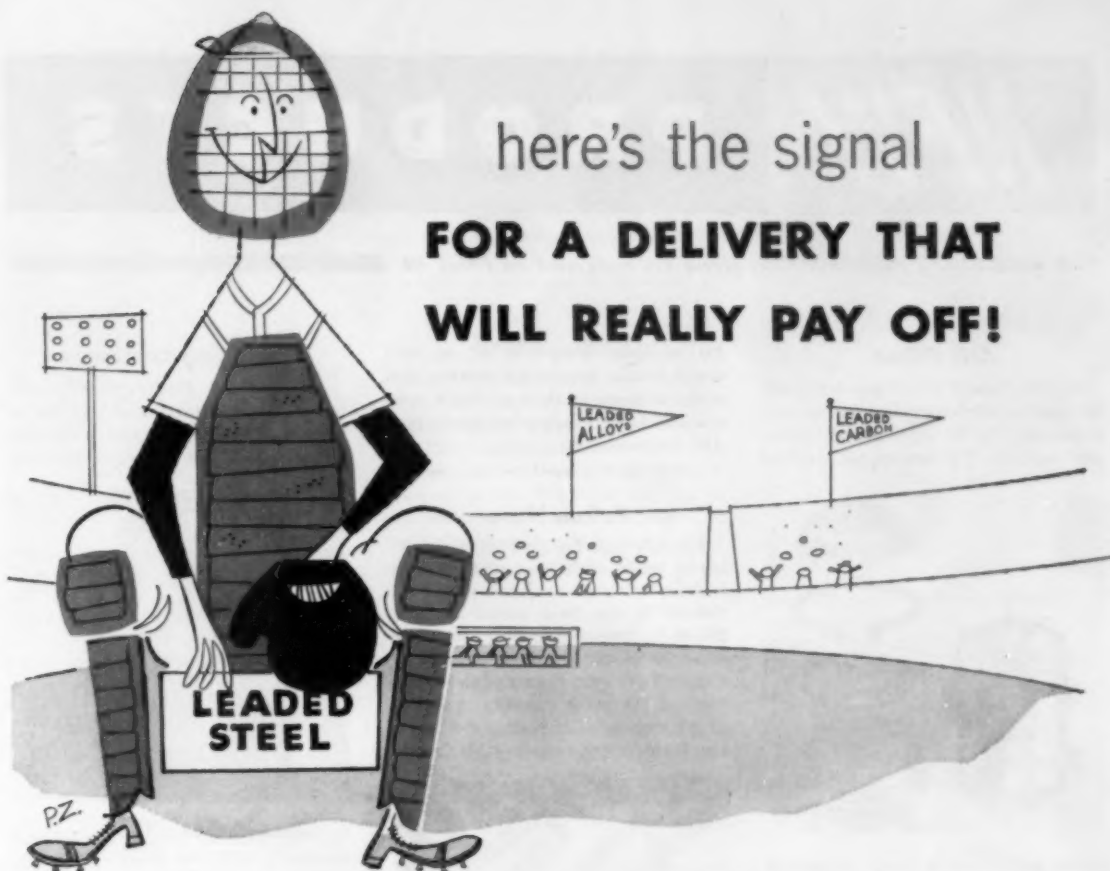
(No. & Street)

(City)

(Zone)

(State)

USE THIS POSTCARD



here's the signal
**FOR A DELIVERY THAT
 WILL REALLY PAY OFF!**

Are high machining and tool costs
 knocking profit out of your daily
 battle for quality production?

Then here's the pitch—Try Aristoloy
 leaded steels. The faster feeds and
 speeds, freer machining and longer
 tool life of these steels will strike out
 excess tool costs and put production
 line breakdowns out of the game.

Copperweld Aristoloy Leaded Steel
 is truly "the steel with built-in
 productivity."



For further details
 write for free booklet
 "Lead Treated Steels"



COPPERWELD STEEL COMPANY • STEEL DIVISION • WARREN, OHIO

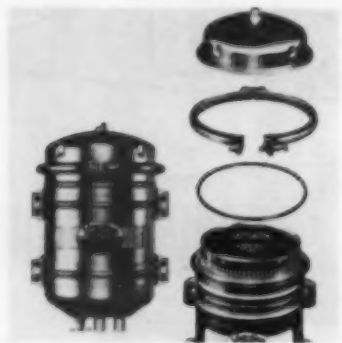
NEW

PRODUCTS

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Oil Filter

Oil filter model 272-C was developed for mobile, stationary and marine engines with up to three-gallon crankcase capacity. The new unit is smaller,



lighter and easier to mount in limited space than the 500 and 750 series units. Features include single bolt closure for simplified screw-in pack replacement, positive sealing O-ring type gasket, and one-piece extruded steel housing and rugged mounting bracket design. *Luber-finer, Inc.*

Circle 71 on postcard for more data

Clutch-Brake

An a-c electromagnetic clutch-brake that operates without slip rings or rectifier provides mechanical uncoupling of motor and driven unit, fast stopping of output shaft (10 milliseconds), holding torque, and adjustable clutch torque. Model M-6390 is designed for use with 400-c induction motors. It operates on a 1-, 2-, or 3-phase 115-v power supply and can also be used in d-c circuits where the response of solenoid-operated clutches is inadequate. Typical rating is 2.00 lb-in. brake holding torque and clutch-torque, 11,000 rpm, four revolutions coast from 11,000 rpm. It also meets environmental requirements of MIL-M-7969.

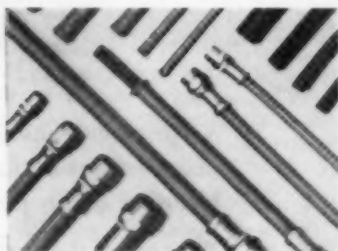
Dimensions are two-in. diameter by

2 1/4 in. long. Weight is 1.1 lb. A-C clutch-brakes for larger motors, and with ratings to 25 lb-in. at 11,000 rpm, are also being readied for production. *Air Associates, Inc.*

Circle 72 on postcard for more data

Teflon Hose

Flexible hose for jet engine plumbing is being made heat and corrosion resistant with an inner core of duPont Teflon. It has been tested to meet Mil-H-5511, operating over the range of -100 to 450 F. It is said to be about 45 per cent lighter than rubber hose of the same capacity, and has 29 per cent smaller diameter. Shown are inner cores, upper right; com-



plete hose with stainless woven braid, upper left; and hose assemblies with crimped-on fittings, lower groups. Sizes available range from 1/4 to 1 1/4-in. OD. Only one type is needed for fuel, hydraulic or lubrication fluids. *Titeflex, Inc.*

Circle 73 on postcard for more data

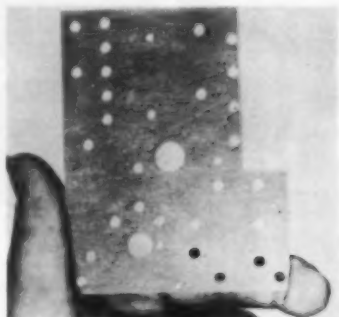
Battery Cable

Aluminum battery cables are now being mass produced weighing half as much as a corresponding copper cable. Being two wire gage sizes larger than the copper accounts for a lower electrical resistance, and total resistance is further lowered by the use of aluminum eyelet terminals. These assemblies, produced with either cast brass or die cast battery terminals are now able in production quantities. *Automotive Div., Essex Wire Corp.*

Circle 74 on postcard for more data

Punching Laminate

An electrical grade phenolic laminated plastic which can be punched at room temperature is now available. Grade XXXP-470 Phenolite is suited



for copper-clad printed circuits where automatic processes require close registration of punched mounting holes for component inserters. Permitting punching at temperatures as low as 68 F, the new grade assures precise dimensions of holes and hole spacings.

Cold punching laminate is available in the same thickness range, tolerance, and sheet sizes as other XXXP grades. Its properties of high insulation resistance and low electrical losses, even under severe humidity conditions, match or exceed values of these properties for hot punching grades. Also, copper clad bond strength and hot solder dip properties of the new product are comparable to other copper-clad grades in the line. *National Vulcanized Fibre Co.*

Circle 75 on postcard for more data

Pressure Control

An electric system with proportional control characteristics for cabin pressure control for airliners is now in production. Change in cabin pressure is usually held below 300 fpm even when the aircraft is climbing or descending at a greater rate. *Kollsman Instrument Corp.*

Circle 76 on postcard for more data

Fastener

A new high-load, positive-locking, structural fastener called Dual-Lock has been introduced for panel fastening of shipping containers, aircraft



cowlings, guided missile assemblies, sheet metal guards and partitions, and to all butt-joint fastening. It can be mounted by recessing in panels or can be surface mounted on sheets, panels or assemblies. It is claimed to be absolutely vibration-proof and impact-proof; trigger action insures full open and full closed positions. Double-acting take-up insures heavy closing pressure, provides pressure-tight seal when gaskets are used. There is no possibility of a semi-closed fastener as trigger mechanism acts only on contact with female engaging pin, insuring positive lock. It will withstand 7000-lb tension and can be readily modified for light-load applications. *Simmons Fastener Corp.*

Circle 77 on postcard for more data

Foam Material

Collo Allfoam, a polyurethane foam material manufactured under license in America, is a predominately closed-cell synthetic cellular material. The manufacturer has developed a technique to foam polyurethane material in continuous slabs, the length of which is limited only by the length of the building, but averages about 20 yards. The standard soft-elastic material comes in various thicknesses up to eight in. and in widths up to 54 in. It can be cut, sliced, formed and shaped with conventional tools, scissors, bandsaws, etc.

Density can be varied to suit different needs and ranges from two to 10 lb per cu ft for soft elastic. The pore structure can also be controlled, so that textures varying from a suede like finish to a wide pore structure are available or can be specially manufactured. The material is not foam

or sponge rubber, nor is it chemically related to vinyl or cellulose materials. Other features claimed for the material include high strength-weight ratio in compression; resistance to solvents, oils, mildew and insects; rapid compressibility and slow return cycles; thermal insulating power; and ease of sewing. *American Collo Corp.*

Circle 78 on postcard for more data

Brake Lining

Ceramic-base brake lining designed to meet the searing heat of high-speed aircraft brakes is now being manufactured also as lining for industrial and automotive clutches. Cerametalix is reported to last five times as long as the best organic-base lining, and to double the torque grip or permissible power loading. The new facing material, now used for the brakes of aircraft, contains no resin or other organic substance. The base is a ceramic material inherently stable at high temperatures.

For power-transmission applications, the aircraft-type friction material is contained in shallow metal cups for quick attachment to the clutch plate. The wearing surfaces will not glaze but will retain their original coefficient of friction and effectiveness down to the last usable thickness of the material. *Marshall-Eclipse Div., Bendix Aviation Corp.*

Circle 79 on postcard for more data

Standard Levers

Assembled from stocked forgings without requiring special dies or tooling, levers to control earth-moving machinery, trucks, buses, hydraulic equipment, etc., are now built up of standard upper half and lower half assembly forgings, hubs, sub levers and extensions. *Batavia Metal Products Corp.*

Circle 80 on postcard for more data

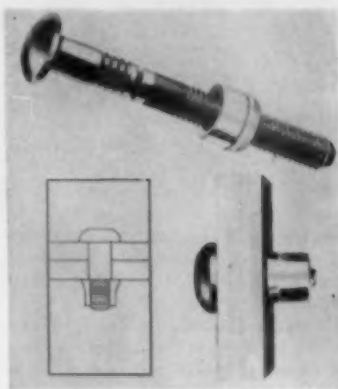
Control Cylinder

Improved hydraulic cylinder, model 248-80 with a depth control feature, so-called Stroke-Control, allows positive setting of the stroke movement of the cylinder arm, permitting easy selection of any stroke setting. It is designed for controlling grader blades, plows, combines, and many other types of heavy or light tillage equipment. *Dukes Co., Inc.*

Circle 81 on postcard for more data

Lockbolt

A commercial lockbolt which replaces rivets, bolts and other fasteners is designed for greater speed and uniformity. It consists of two



precision made parts—a pin and a collar. In using the fastener, the locking collar is placed over the projecting pin tail and a gun is applied to pull the work together and swage the collar into the locking grooves on the pin. The pin is broken at the breakneck groove and the pin tail is automatically ejected. *Townsend Co.*

Circle 82 on postcard for more data

VHF Radio

Twenty-seven channel VHF transmitter and receiver model VC-27 can accommodate all 25 crystals now used for airport and en route traffic control and communications and two additional crystals for special communications purposes such as flight test, instruction, radar control, etc. Miniaturized crystals for use in the model UDI-1 Distance Measuring Equipment permit installation of these 27 crystals in a unit the same size as the previous Simplex model which accommodated 12 crystals.

To assure uniformly high power on all frequencies the wide band transmitting unit consists of six separate transmitting circuits. The tunable receiver embodies the "whistle-stop" tuning feature. This permits positive tuning to any desired frequency without looking at the dial. It is accomplished by setting the transmitter channel on the same frequency to which the receiver is to be tuned. By pulling out the crystal tuning knob, the transmitter generates its own local signal precisely on the frequency desired. *National Aeronautical Corp.*

Circle 83 on postcard for more data

Observations

By Joseph Geschelin

Summer 1955 In Scandinavia

A vacation tour of the Scandinavian countries as well as Holland this summer was not only a pleasurable experience but it gave the writer a better insight into the economic life of one of the most civilized regions of the world. Sweden is highly industrialized and has vast potential in minerals. The mines in Kiruna—which we saw on the way to Abisko in Lapland—are producing high grade (60 per cent) iron ore at the rate of around 9-million tons yearly. Up to now they have employed strip mining methods almost exclusively.

The ore is shipped in small ore cars by the train load around the clock to Narvik, thence by water to England and the USA. It is estimated that ore reserves are good for 200 years or more.

Gothenburg, one of the major ship-building centers, currently employs around 20,000 workers, building ships for the world. Gothenburg too is the home of Volvo, one of the major producers of motor cars, trucks, buses, and engines. It is also the home base of the famous SKF industries.

Late in July we noted a news item commenting on a new find in copper in Norway. There was no official confirmation nor any indication that this find was to be exploited.

Scandinavia is buzzing with economic activity and is ripe for sales of home refrigeration, appliances, and motor cars. The big problem facing American producers is that of currency and import licenses. Germany is making large gains here, particularly in exports of motor cars and consumer goods. The USSR is also very busy in establishing trade relations. They are consuming most of the fish crop of Norway and in return have an almost exclusive hold on motor vehicle imports.

To the American traveler Scandinavia is a major corner of the world where he seems to be genuinely welcome—and it makes traveling a pleasure indeed.

Sunshine is a precious commodity in Scandinavia. So much so that all workers must have a three-week vaca-

tion, generally between the middle of July and the first week in August as a matter of law. This is something that only seasoned travelers know—at least we didn't. At any rate, during this interval the GM, Ford, and Chrysler assembly plants were shut down; and Volvo, where we expected to spend three or four days touring the plants, was closed down. Volvo is in the midst of extensive plant construction in Gothenburg at the moment. While we were there early in August they were putting the finishing touches on one of the most modern body paint shops we have seen anywhere. Although it is designed for an output of only 30 bodies an hour—small by our standards—in layout and equipment and modernity it is a model plant indeed.

Drive Right

We understand that by 1957 Sweden intends to abandon its traditional left hand drive traffic system and switch over to right hand drive. It will be an interesting experiment since it involves not only lifetime driving habits but changes in traffic signs, many intersections, and other details.

Automobile Market

The market for American cars in Scandinavia, we learned, is even smaller than it was a few years ago. In the first half of 1954 Sweden registered 6.5 per cent American cars; in the corresponding period this year, the total was down to 5.8 per cent. British cars, accounting for 35.9 per cent of registrations in 1954, were down to 16 per cent in '55. The biggest gain was in cars imported from Germany. Whereas in '54, German-made cars represented 23.1 per cent of registrations, in '55 the figure rose to 49.2 per cent. Incidentally, the biggest gains have been recorded by Volkswagen, rising from 7.16 per cent in '54 to 21 per cent in '55. Popularity of the Volkswagen cars and trucks is due, we were told, not to lower cost but ease of maintenance and lower repair cost.

In appraising the market for motor cars in Scandinavia, it is important to note that besides the demand for small, light vehicles, suited to the roads and streets in this region, car buyers demand vehicles that will be good for 12 to 15 years in the hands of one owner.

There are some other serious barriers. For example, in Sweden and Denmark the cost of American cars is beyond the reach of most buyers. In Norway, by contrast, the government simply does not approve import licenses. The reason is quite understandable. Fishing is one of the chief industries, and most of the herring crop is consumed by Russia. Hence, Russian cars and durable goods enjoy preferential treatment to balance the exchange.

We talked with a dealer in Oslo who has represented an American motor car producer for 35 years. Today he is permitted to import only 30 cars a year—and these are exclusively for taxicab service. A distributor in Copenhagen who had handled American cars for over 30 years now depends entirely upon Volkswagen and English cars. In fact, he was completing a large building to be used exclusively for servicing Volkswagen cars.

General Motors, however, is in excellent shape in Copenhagen and Stockholm for some understandably good reasons. Stockholm, for example, assembles not only Chevrolet but Opel and Vauxhall, as well as Bedford, Chevrolet, and GMC trucks. Opel has cashed in on the popularity of German-made cars, thus helping to boost sales volume. In '54 Opel represented 5.89 per cent of registrations in Sweden; in '55 the total rose to 13.19 per cent.

Nuclear Power

At the Powerama press conference H. H. Curtice, GM president, said in answer to a question that the corporation is engaged or will be engaged in studies of all phases of nuclear power. Just about the same time we

(Turn to page 130, please)

**you can
SAVE TIME
and
MONEY
on
jobs like this
with
the**



...GISHOLT SPEED SELECTOR!

HERE'S WHY:

No manual gear shifting! You simply turn this hand wheel or touch a trip lever (for Direct or Pre-set operation). Shifting is automatic—by hydraulic power—while the operator positions the new tools for the next cut.

It's all so much simpler with the Speed Selector. There's no need for time-wasting computations, no mental effort, no physical effort. With simple controls, either direct or prearranged, the operator gets the ideal f.p.m. cutting speed for each cut. And it's *much faster*, of course!

The Speed Selector is standard on Gisholt Nos. 4 and 5 Ram Type Turret Lathes and on all Gisholt Saddle Type Lathes.

GISHOLT

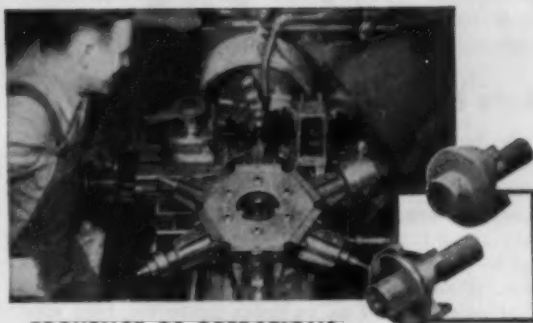
MACHINE COMPANY

Madison 10, Wisconsin



THE GISHOLT ROUND TABLE
represents the collective experience of
specialists in the machining, surface-finishing
and balancing of round and partly round
parts. Your problems are welcomed here.

HERE'S HOW:



SEQUENCE OF OPERATIONS:

Note the star which indicates each time the Speed Selector is used.

- ★ 1. Hexagon turret—Center drill at 297 r.p.m. hand feed
 - 2. Hexagon turret—Support with live center
 - ★ 3. Square turret—Rough turn and face at 96 r.p.m., .003 feed
 - ★ 4. Square turret—Finish turn, face and chamfer at 126 r.p.m. .002 feed
 - ★ 5. Hexagon turret—Start and drill through at 226 r.p.m., .003 feed. Trip the Hi-Le lever, eliminating even the need for turning the hand wheel
 - ★ 6. Hexagon turret—Thread with tap at 39 r.p.m., leaders and followers
- and you're ready for a new workpiece

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

METALS

Copper Goes to 43 Cents per Pound, Fourth Price Hike This Year. Increasing Demand Continues for Aluminum.

By William F. Boericke

Steel Demand Heavier

By mid-September the steel industry was experiencing the strongest seasonal upsurge of the postwar period. On top of continued heavy demand from Detroit, insistent clamoring from railroad car-builders, and loud complaints from consumers who had been promised steel and didn't get it, came the call to supply steel for rehabilitation of the flood-stricken areas of the north-east.

Quite understandably, the flood sufferers were given top priority in their needs for rebuilding bridges, roads, and construction. Heaviest demand was for plates which were also called for by the freight car builders. These users had to suffer cuts in their allotments, much to their distress. No estimates have been made for steel tonnage needed for repairing flood damage, but it will be large.

Rate Below Theoretical Capacity

In the meanwhile the steel operating rate has not advanced above 93.8 per cent of theoretical capacity although orders are crowding the books and sales managers are tempted to tack up the sign "Buyer, stay away from my door." The repair program has not been completed, but that is not a sufficient explanation. It now appears that the 125.8 million tons annual capacity used as an index figure for 1955 may be a little overstated. Last year the figure was 124.3 million tons. Quite likely both figures included some obsolete, high cost equipment that simply could not stand the tremendous strain being currently put upon the industry.

First Quarter Orders for 1956

Some mills have begun to accept orders for the first quarter of 1956, several weeks ahead of ordinary schedule. Consumers want to make sure they are safely on the books. While inventories are low, as yet there have been no actual shutdowns for lack of steel. But deliveries are anywhere from two weeks to 2 months behind promises. In spite of tight supplies, users are shying away from costly conversion deals.

It appears certain that steel demands will continue unabated through the rest of the year and well into

the first quarter. Steel men, at first somewhat skeptical that demand from the automobile industry could hold up at its dizzy rate, have had no indication from the manufacturers that following model change overs there will be any slackening in orders.

The steel scrap market has been wavering. Big consumers bought heavily when No. 1 heavy melting scrap was \$40 and have stayed out of the market when it advanced to \$45. But scrap dealers are not worried. It is difficult to visualize a high operating rate for the industry with a weak market for scrap.

Copper, The New Precious Metal

When Anaconda raised the domestic price of copper from 40 cents to 43 cents a pound, an increase followed shortly by all other producers of the red metal, it marked the fourth price hike since last January when copper sold at 30 cents a pound. This made a 43 per cent increase in eight months, incomparably more than for any other major metal in the same period.

It is certainly debatable if such a price is for the best interests of either producer or consumer, yet it must be admitted the producers had little choice. With the price of copper on the London Metal Exchange at the equivalent of 50 cents a pound and the Chilean government insisting that its production, on which the United States is vitally dependent, should be sold on the higher market, a price increase to meet at least partially the European market was plainly called for.

The important Prain group of Rhodesian copper mines evidently saw things the same way. While opposed to high prices, they could not hold out at 40³/₈ cents and raised to 45 cents a pound early in September. At the same time they changed their pricing policy. Formerly the set price was guaranteed for 30 days. Now it is subject to change on 24 hours notice.

Price Trend Uncertain

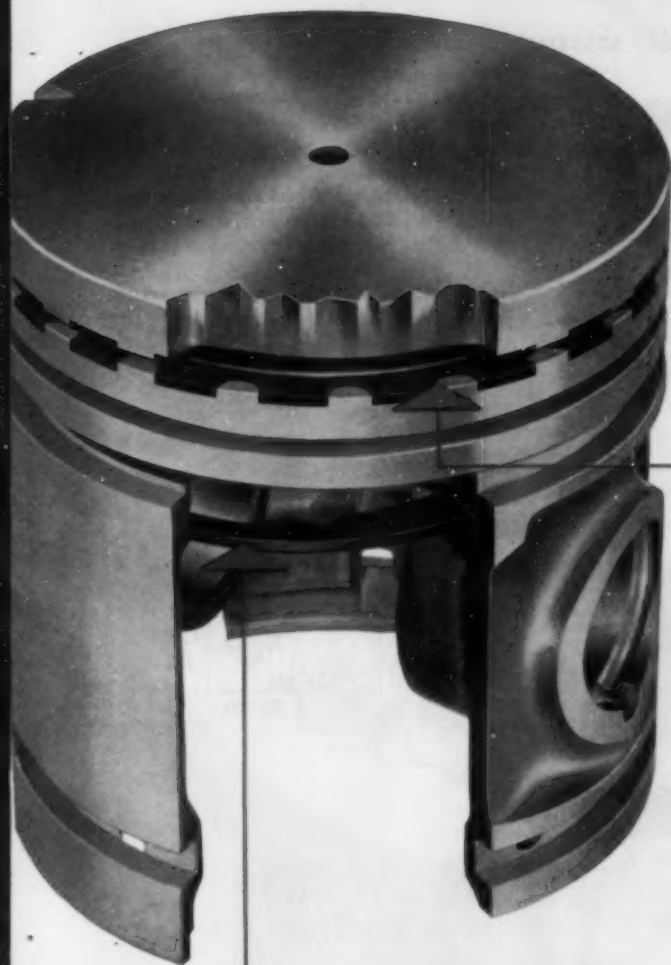
In our own domestic market there is no unanimity as to the future price trends. Copper futures have sold on the Commodity Exchange at 50 cents. A custom smelter has been selling at the same price and small lots of copper have sold even higher. The metal is definitely in the scarcest supply and this condition is likely to obtain through the fourth quarter. At least this length of time will be needed to fill pipelines and restore inventories.

Even the largest copper consumers that are linked

(Turn to page 132, please)

NOW!

STERLING CONFORMATIC* PISTONS



CONFORMATIC STEEL CONTROL MEMBER, anchored at the pin bosses only, controls skirt clearance . . . hot or cold! The metered steel insert allows you to specify the piston clearance you want for your engine. (Clearances from zero to $\frac{1}{16}$ thousandth inch are generally recommended.)

are
available with
LOW COST

Intra-Cast* STEEL-LINED GROOVES

Steel protection—top and bottom—gives sensationally longer life to rings and grooves.

This ring is *integrally cast* into the piston . . . positioned so that when the grooves are machined, the top ring groove is *lined with steel* and has islands of aluminum for ring cooling. This Intra-Cast steel-protected groove resists enlargement and materially reduces top ring land wear and rounding. And, it does it at far less cost than other methods.

* Tradename Registered

STERLING ALUMINUM PRODUCTS INC.

ST. LOUIS, MISSOURI

AUTOMATION NEWS REPORT

FEEDBACK

AUTOMATIC CONTROLS
PRODUCTION — VEHICLES — AIRCRAFT

By Paul Kennedy

NEXT TEN YEARS

Electronics, a large portion earmarked for automation, will expand in 10 years to 2½ times its present volume of \$8 billion a year. So agreed several manufacturers attending the conference on Electronics and Automatic Production at San Francisco late in August. Automation, said one speaker, will in the

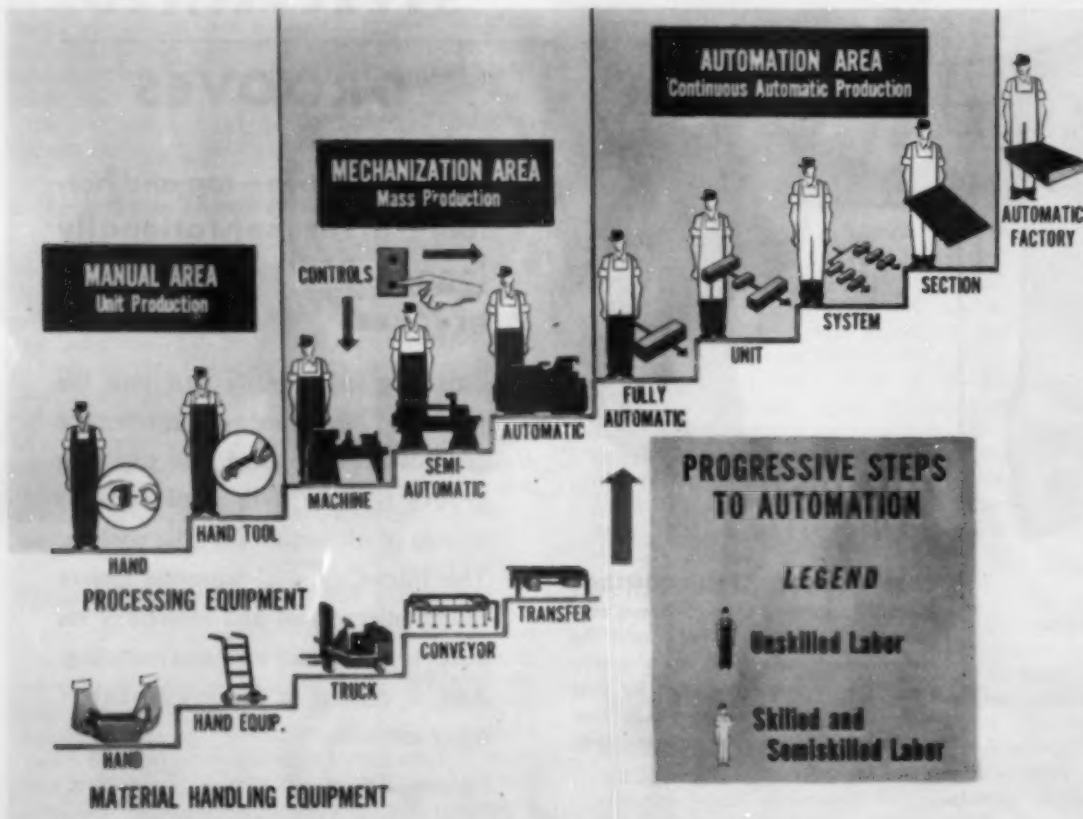
foreseeable future employ very complex electronics.

But, explained Dr. D. E. Wooldridge of Ramo-Wooldridge Corp., this equipment is merely a "tool in a much more complex system of human organization, machines, methods and procedures." This means, he explained, that future automation will be qualitatively different from past devices, just as nuclear bombs, while still weapons, are basically different from earlier bombs.

SYSTEMS APPROACH

Dr. Wooldridge called for the "systems" approach to automation. This is the method whereby an experienced team has broad responsibilities to handle highly technical questions as well as non-technical matters, as a single integrated problem. Industry will be faced with highly complex problems in making further progress in automation, he said. Industry can profit from the lessons learned by the Government in its recent weapons systems experience. The "black box" approach, where the bombardiers and navigators attempted to specify and order radar equipment to combine with a bombsight, was unsuccessful, he stated,

(Turn to page 106, please)



Automation, to General Electric engineers, is continuous automatic production, a way of manufacturing. They have drawn up this chart to illustrate the three progressive steps to automation, and to show redistribution and upgrading of labor skills.

Nearly **50%***

of all passenger cars produced from Jan. 1 to
September 3, 1955 were equipped with the



U.S. Patents 2,630,822 and 2,965,825

* Of the 5,561,770 U.S. passenger cars produced in this period, 45.7% were equipped with Type "98" Chrome Oil Ring. 54.3% were equipped with all other oil ring types combined, including other Perfect Circle oil rings.

**CHECK THESE
REASONS WHY**

it has been proved better than any other
oil ring for high-compression, high-vacuum
overhead valve engines!

- ☐ Uniform pressure on entire circumference
- ☐ Multiple tiny springs exert both side and radial pressure
- ☐ Provides maximum oil drainage
- ☐ Universal application...bottomless and conventional grooves...all depths

Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Toronto, Ontario

Industry News

(Continued from page 39)

Warner & Swasey Seeks To Buy Lansing Concern

Duplex Truck Co., Lansing, Mich., will become a division of Warner & Swasey, Cleveland, if plans to purchase the Lansing firm are approved. Under the agreement, Warner & Swasey would acquire all of Duplex's assets and business. Stockholders of the latter concern would receive one share of Warner & Swasey stock for every three shares of Duplex.

Warner & Swasey, maker of machine tools and precision equipment, had sales totaling more than \$232 million last year. Sales by Duplex, which makes special trucks for industrial use and engine generators, amounted to \$2.7 million.

Allis-Chalmers Contract Features Novel Pay Plan

Allis-Chalmers Manufacturing Co. and the UAW-CIO have agreed on a new three-year contract covering 17,500 employees in six plants. While most of the provisions in the contract closely parallel those incorporated into contracts of the Big Three car companies and other smaller firms, there is a basic difference in administering the supplemental unemployment benefit plan.

Unlike all contracts signed thus far, the plan calls for payments amounting to 65 per cent of "take-home" pay during layoffs, including state unemployment compensation, for a maximum duration of 26 weeks. Other contracts negotiated in the industry provide 65 per cent for the first four weeks and 60 per cent during the remaining 22 weeks. Another important feature in the Allis-Chalmers pact is the way

benefits will be paid to employees.

An employee can either draw payments each week during the time he is unemployed or he can have the payments held over and collect them in a lump sum when he returns to work. In effect, the laid-off worker can draw from only one fund at a time—either state unemployment compensation or the supplemental benefits from the trust fund to which the company contributes under the modified GAW plan.

The Allis-Chalmers pact provides an immediate wage increase of six cents an hour, or 2½ per cent, whichever is higher, and a similar boost each year through 1957, in addition to a general wage increase of three cents. Several other benefits patterned after the Big Three contracts also are included in the new pact.

Clark Equipment Plans Facility on West Coast

Clark Equipment Co. will establish a West Coast plant before the end of the year. It will be used as a parts depot at the outset and later will be expanded as an assembly plant for fork lift trucks.

The new plant will be located in the San Francisco-Bay area, and several properties are being investigated. Complete stocks of service parts for Clark and Clark-Ross industrial trucks and straddle carriers and for Michigan tractor shovels and excavator cranes will be warehoused.

French Tractor Manufacturer To Set Up a Plant in Brazil

The French tractor company "Continental" intends to establish in Sao Paulo, Brazil, a factory for the manufacture of tractors. It is planned that four years after the start of production the plant will produce a line of four types of tractors.



Back in fiscal 1913, the interest on the public debt amounted to approximately \$23 million—or about 24 cents for every American. For the fiscal year that ended last June 30 (1955), estimated interest on the public debt was calculated at \$6.8 billion, and the per capita figure had risen to \$42.18.

There are 58 million vehicles registered in the U. S. which travel an estimated total of about 600 billion miles a year. Government authorities predict that over 80 million vehicles will be on the roads by 1965 and traveling well over 800 billion miles a year.

Farmers own 12 per cent of all passenger cars and 29 per cent of all trucks in the U. S.

Volume production and engineering know-how have reduced one aircraft manufacturer's cost of a modern jet fighter by two-thirds. Today the Air Force buys three of these fighters for the same price paid for one at the beginning of the program.

A tiny gas generator designed for guided missiles weighs 3½ lb and develops 850 jet hp—more than the total horsepower developed by three Cadillac automobiles.

JULY NOT UP TO JUNE BUT SEVEN MONTHS TOTAL WAY OVER THAT OF LAST YEAR

Regional Sales of New Passenger Cars

Zone	Region	July 1954	June 1954	July 1955	Seven Months		Per Cent Change		
					1955	1954	July over June	July over July 1954	Seven Months 1955 over 1954
1	New England	38,671	38,327	29,040	237,683	203,770	+ 1.54	+19.79	+16.60
2	Middle Atlantic	127,832	125,296	93,827	709,520	641,530	+ 2.02	+36.83	+34.83
3	South Atlantic	79,909	87,925	89,967	513,630	388,719	-12.88	+38.63	+33.16
4	East North Central	183,400	186,820	116,767	1,061,880	940,703	- 1.02	+41.15	+28.27
5	East South Central	34,727	33,061	20,700	206,070	181,167	+ 2.96	+67.38	+27.07
6	West North Central	94,236	96,950	47,774	582,680	525,863	- 0.02	+13.51	+11.38
7	West South Central	62,002	72,812	40,800	373,242	316,753	-16.86	+26.54	+17.93
8	Mountain	26,791	24,015	14,410	138,760	87,404	-12.00	+43.61	+34.25
9	Pacific	72,888	77,340	47,000	479,818	316,826	- 0.00	+53.48	+81.94
	Location Not Determinable					1,837			
Total—United States		847,948	891,372	474,516	4,165,020	3,291,116	- 8.01	+36.46	+26.88

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Nev., Wash.

In over 100 places... (here are just a few examples)

Rear Window Weather-
strips
Tail Pipe Insulator
Support
Wiper Hose
Antenna Gaskets
Division Channel
Weatherstrip

Battery Drain Tubes
Gearshift Lever Arm
Bushing
Frame and Axle Bumpers
Spring Shackle Bushings
Radiator Drain Tube

Dash Liner & Cowl Trim
Pads
Door Check Arm
Bumpers
Headlight Lens Gasket
Gas Tank Filler Neck
Grommet

Radiator Hose
Heater Hose
Body Insulators
Steering Post Bracket
Insulator
Spark Plug Covers
Parking Light Lens Gasket



Enjoy Butyl parts help new cars perform better

Many of today's cars run like new, drive like new, perform like new for extra thousands of miles with over 100 parts made from Enjoy Butyl—the super-durable rubber that has a low cost, yet outperforms and outlasts, by great margins, rubbers formerly used. Under the toughest conditions of weather and use, Enjoy Butyl parts *stay like new*.

This amazing rubber—finding wider and wider use in the automotive industry—is now readily available in new non-staining grades for white and light-colored parts. For further information, and for technical assistance in the uses of Enjoy Butyl, contact the Enjoy Company.



ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.
District Office: 11 South Portage Path, Akron 3, Ohio.



Enjoy Butyl is the super-durable rubber with outstanding resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

35 SUCCESSFUL YEARS OF LEADERSHIP IN SERVING INDUSTRY

AUTOMOTIVE INDUSTRIES, October 1, 1955

101

Overall view of the Thompson Alspray at right shows the valves leaving the Ajax unit.

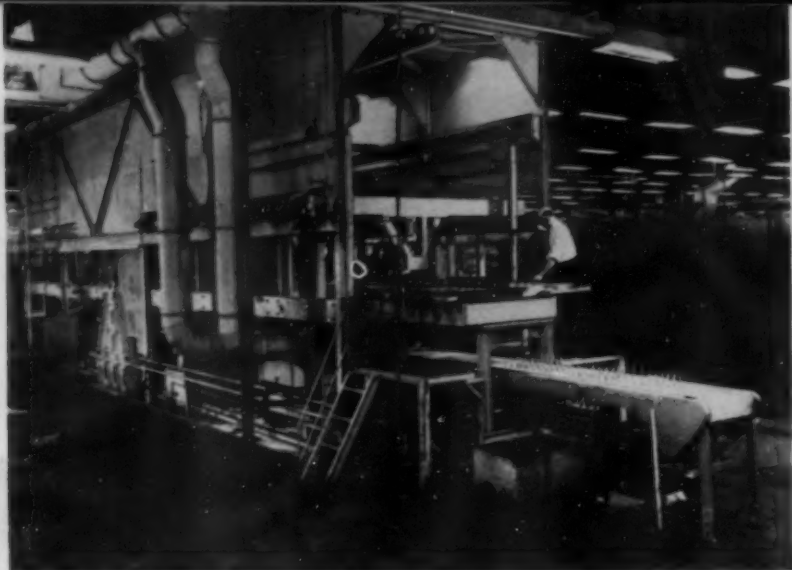
NEW SPRAY COATING PROCESS

Prolongs Service Life of Valves

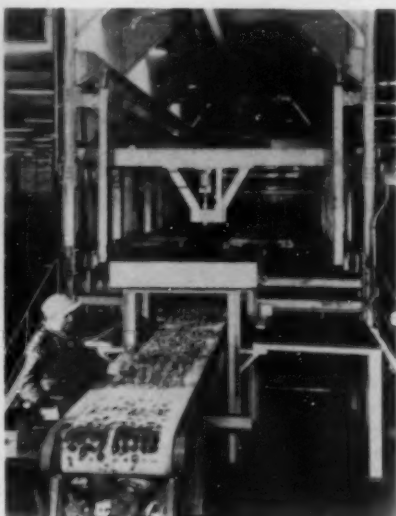
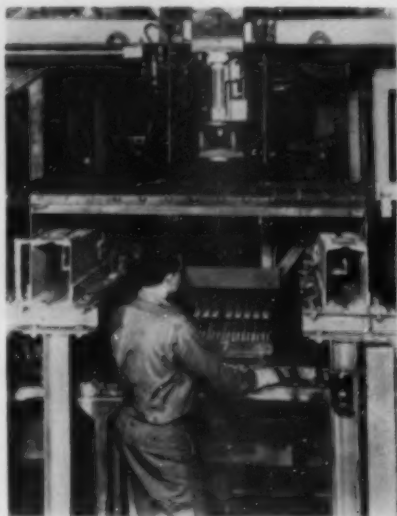
ACCORDING to General Motors, the life of engine poppet valves can be increased by as much as 100 per cent when they are processed with an aluminum coating on the valve face or head. Originally known as the Aldip process, the method has been improved upon and is now known as the Alspray process. The new method is currently being used at Thompson Products, Cleveland, under GM license, for coating valves for Chevrolet engines.

With the new method, the aluminum coating is sprayed on instead of the valves passing through a special salt flux for preheat and then being dipped in molten aluminum. Excess aluminum was then removed by vibration, air blast, or spinning. With the new method, the valves get an even application of aluminum in much less time. Except for load and unload, the process is entirely automatic.

Valves going through the process at the Thompson plant are first preheated to 250-300 F while moving on a special conveyor built by DeVilbiss. The conveyor moves past a series of gas torches and then to the Metco metalizing guns. As the valves move past the guns, they are rotated as they are sprayed. This



Below left—Start of the Ajax bonding-fluxing-cleaning unit used with the Alspray process for coating the head of engine poppet valves. The valves have previously been sprayed with aluminum. The operator loads 30 valves into a wooden partitioned box and then the special fixture grips the valve stems and moves them through the machine. Below right—Unloading end of the Alspray setup. All valves are thoroughly inspected prior to shipment.



insures a fine even coat to the face of each valve.

After cooling, the valves are loaded manually into a special fixture which carries 30 valves at a time into an Ajax salt bath furnace. Fluxing and bonding takes place in the Ajax equipment which utilizes a special GM patented salt solution. This compound is made up of 40 per cent sodium chloride, 40 per cent potassium chloride, 10 per cent sodium aluminum fluoride, and 10 per cent aluminum fluoride. At the bottom of the salt bath chamber, there is a four inch layer of molten aluminum.

(Turn to page 134, please)

ANOTHER EXAMPLE of
REDUCING COSTS WITH—

Buhr

ECONOMATION

Drills, chamfers, spot-faces and individual-lead-
screw taps 377 master-brake
cylinders an
hour gross....



and features electronic
mechanism for checking broken drills!

This 7-way dial-type hydraulic-feed Buhr Special has a 48"-diameter 7-position power-operated index table, complete with shot bolt. Two parts are loaded per station in each of its seven fixtures. Automatic clamping of fixtures is performed by a power-wrench with torque control.

Electronic mechanism automatically checks two .028 drills. Following each cycle, drill-checking arms swing sensing probes to and from drills. If either drill is broken, special electronic sensing-circuit stops machine and flashes failure-light.



Buhr

MULTIPLE-SPINDLE
HIGH PRODUCTION MACHINERY

Find out how Buhr Economation can reduce your production costs. Phone, wire or write us. A consultation with one of our top sales executives will be arranged promptly!

BUHR MACHINE TOOL CO. ©
ANN ARBOR, MICHIGAN

Solidly Engineered • Precision Built • for World's Leading Manufacturers

Chicago Machine Tool Show

(Continued from page 64)

National Acme Co., Electrical Manufacturing Div. booth was a heavy duty limit switch of the double-pole, double-throw type. One of the first of this type, the Snap-Lock switch, can be used also as a single pole, double-throw switch or in combinations as a distribution switch. The company's Threading Tools Div. showed the Fette self-opening thread rolling heads for high speed threading on present machines. Other new equipment included power-operated chucks and rotary geared pumps.

A portion of an automated production boring line was operating at the Heald Machine Co. exhibit. Operations performed on this portion of a simulated complete piston line are finish boring the wrist pin hole and turning the O.D. Other operations can be handled in a complete line as necessary. The automatic features of this show setup are: Orienting, loading, boring, unloading, gaging, sorting, flushing, conveying. At machine No. 1, work enters the loading chute from the conveyor and rolls down into an orienting station where all pistons are properly aligned for wrist pin hole boring. Ratchet feed then advances work into the boring station, where it is automatically clamped and located. A single feed-out quill with two boring tools enters the piston, with first tool rough boring and second tool semi-finishing on in-stroke. The quill feeds out 0.002 in. and second tool finish bores on outstroke. Work is then unclamped and advanced to an air gaging station, where over or under-size parts can be automatically sorted out of line. Work then rolls through a flushing station where all chips are washed away. Work is then elevated back up to conveyor and advanced to the second machine.

At machine No. 2, pistons roll down a loading chute into the orienting station where they are rough aligned with pin holes in proper position for loading and for turning operations. A pin in the loading arm then picks up the work and swings it down into the chuck where it is precision located and clamped for elliptical box turning, after which arm retracts out of the way. The rotating tool holder carries a fixed roughing tool and a feed-out semi-finishing and finishing tool. On in-stroke, piston skirt is rough and semi-finish turned. Feed-out quill then advances 0.002 in. and O.D. is finish

turned on outstroke. After turning, work is air gaged while still in chuck. Correctly sized parts are unloaded and deposited on the conveyor belt by a pivoted unloading arm.

At each gaging station, feedback to the tooling could be provided if desired, compensating for size variations without operator attention. It is not used in this case because aluminum does not present any tool life problems and off-size parts are rarely encountered.

Gerac is the name given to a new gear finishing system demonstrated by Illinois Tool Works. It is a positive, geared-up process. Two cutting tools are mounted one above the other on the same arbor. Only one cutter is engaged at a time and finishes one side of the gear teeth. After one side is completed, the other cutter is moved into position and the direction of rotation is reversed. Tool sharpening is done on cylindrical grinders. Accuracy

of the new method is said to be independent of preceding operations.

E. W. Bliss Co. premiered its new 25-minute color- and sound movie, "Power Press Maintenance." Produced primarily for showing to plant personnel responsible for upkeep of inclinable and straight side presses, the film reviews the correct procedure for setting up a new press and then demonstrates the proper inspection and maintenance procedures to follow. A new movie on microhoning was previewed at the show. Micro-matic Hone Corp. has available this descriptive story of controlled surface finishing by abrading with honing tools. It is the second in a series to acquaint production engineers with the firm's techniques for finishing interior and exterior surfaces.

Four oil companies, identified as F. E. Anderson Oil Co., E. F. Houghton & Co., Socony Mobil Oil Co., and Sun Oil Co. were commended by Tell Berna, general manager of the National Machine Tool Builders' Association, for their outstanding service to exhibitors at the Machine Tool Show.

NEWS OF THE MACHINERY INDUSTRIES

(Continued from page 80)

ket conditions in the fourth quarter of this year and in 1956 of prime importance to the die casting industry. Because of this situation, a special panel session on zinc and aluminum supply and price control was the outstanding feature of the Institute's annual meeting. The tightness of the supply of aluminum which caused ADCI to request stockpiling relief earlier this year has not eased. While casting ingot, both primary and secondary, remains short, the die casting market is expanding rapidly. Future supply is of major concern.

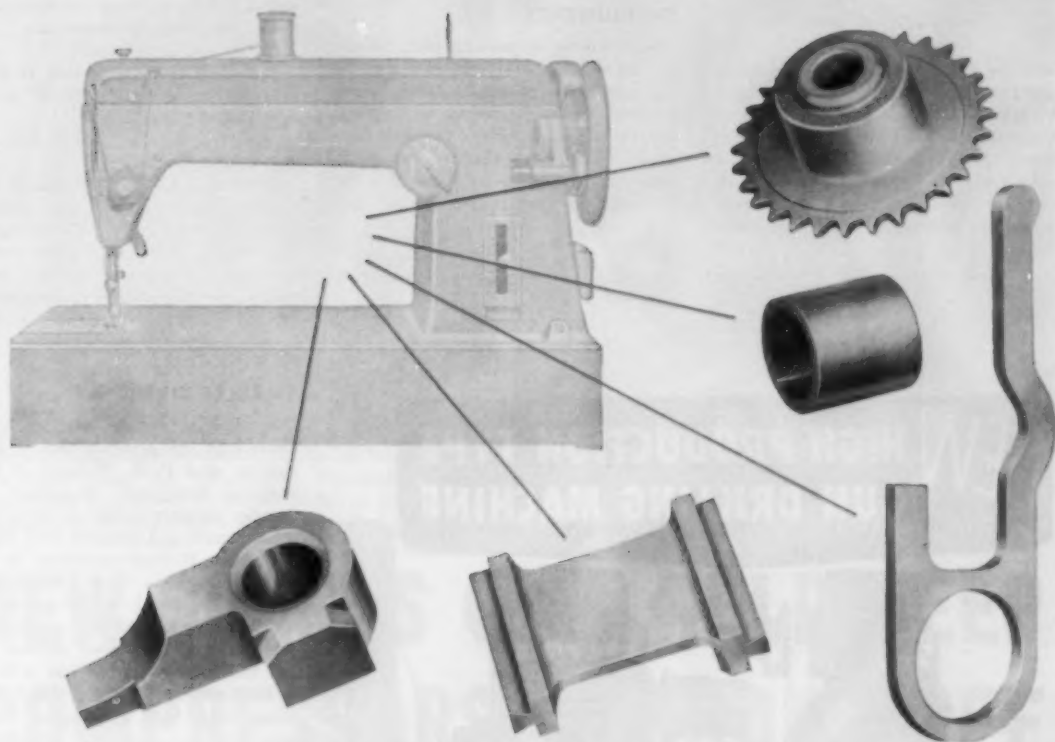
Of outstanding interest to design engineers, purchasing agents and other representatives of users of die castings, was the report on the progress of the Institute's product standards program which was initiated early this year. Release of the first five of the planned series of design recommendations in the Engineering Series has already shown this program to be a unique concept in industry service. Helpline designers in all industries to effect economies when specifying die cast components. Continuing this program, the Institute announced five new product standards in the Engineering or "E" Se-

ries. These important new standards cover "Depth of Cored Holes," "Draft Requirements for Cored Holes," "Ejector Pin Marks," "Machining Stock Allowances," and "Flash Removal."

A long-awaited product standard series reported on was the "M" Series of Metallurgical standards, of which initial releases include alloy cross reference charts, standards covering the composition and properties of Standard and Special Aluminum Alloy Die Castings; and a table of characteristics of aluminum alloys.

Results and plans to expand the Certified Zinc Alloy Plan—a procedure that assures users of high quality zinc base die castings—were discussed at the meeting. Under this plan a licensing certification is issued only to qualified die casters who produce and sell zinc die castings. The CZAP requires that each certified producer voluntarily submit actual production run die castings, selected at random, to an unbiased recognized independent laboratory for test. Only those products that meet the standards for chemical composition required by ASTM specification, may carry the CZAP symbol.

IN POWDER METALLURGY... IT'S AMPLEX



Switching to OILITE helps Make this Manufacturer Competitive

Price competition and rising production costs caused one sewing machine manufacturer to re-examine his component parts to determine how costs could be lowered while maintaining high quality standards.

Super OILITE and Steel OILITE provided the answer. Many parts, including gears, eccentrics and sprockets, were re-designed for production in these high-strength materials. Formed in automatic presses in seconds, these OILITE parts reduced costs

substantially by eliminating costly machining operations... and high quality is maintained.

The conversion provided another benefit. Certain parts were designed to take advantage of the self-lubricating qualities available in some OILITE materials.

Let Amplex help you with your parts problems. The Chrysler-Amplex engineering facilities, unmatched in the powder metal industry, are ready to serve you. Call or write today.

CHRYSLER AMPLEX PRODUCTS

OILITE Bearings

Permanent Metal Filters

Finished Machine Parts

Friction Units

IT'S NEW! IT'S FREE!

First complete information on powder metal bearings, finished machine parts, filters and special parts. 48 pgs. Write today for OILITE Engineering Manual E-55.



Only Chrysler makes OILITE

CHRYSLER CORPORATION • AMPLEX DIVISION

Dept. J-10, Detroit 31, Michigan • Overseas Distribution—Chrysler Export

AUTOMATION News Report

(Continued from page 98)

and the systems method proved to be the answer. "I believe that years can be taken off what would otherwise be the schedule . . . by a proper employment of this systems approach, and conversely that years can be added to the schedule if business and industry make the mistake of assigning over-

all systems responsibility for their automation programs to purely operational, non-technical people."

INSTRUMENTS

Limitations of sensing instruments are among the problems in automating continuous processes. Instruments needed, said V. F. Hanson of du Pont Co., include something to measure new variables such as chemical composition, color, viscosity of flowing streams, and continuous weight per unit length.

HOW TO PLAN

At Chrysler Corp., reported Robert T. Keller at the conference, questions asked before deciding on automation for a particular operation are:

What will be the cost?

What kind of equipment is available or can be developed for us and how reliable is it?

What savings will result from our use of automation?

What will be the real value?

The problem must be explored from the standpoint of savings in floor space, safety, increased production, and improved quality. Sometimes companies reject automation simply because they fail to cover these four points, Keller said.

SMALLER FIRMS

Small business will find its course altered by the growing use of automation, said P. B. Wishart of Minneapolis-Honeywell Regulator Co. Smaller supplier firms can keep their subcontracts and compete with bigger companies if they specialize in certain high-volume items. Small business, he explained, will automatically benefit from the fact that automation-equipment makers need volume, too, and the volume market lies with the large number of plants which have fewer than 1000 employees. Equipment will more and more be designed to fit this market, Wishart said.

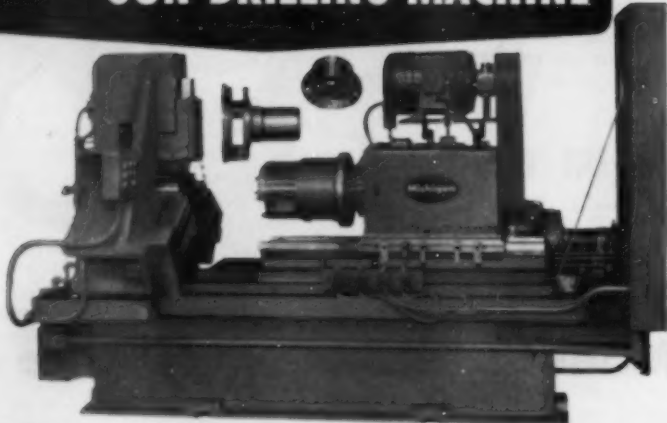
"A forward-looking automation program can enable a [small] company to cause an upheaval in its competitive field," Wishart counseled. He explained that among a group of suppliers making the same item by the same methods, the major threat is that one competitor will find a means to supply the market at a lower price. Whereas a large customer might decide to automate and go into production on the item, losing one customer for the supplier, such a move by a competitor supplier would endanger the bulk of the business.

USING ELECTRONICS

Ryan Aeronautical Co. has installed its latest computing machinery for engineering. An IBM type 650 digital computer, rented for about \$4000 per month, will solve performance problems in half an hour that would take a skilled operator a week to handle. Other new machines are oscillograph analyzers and readers. They interpret raw performance data either on an electric typewriter as numbers, or as curves automatically plotted by a companion machine.

(Turn to page 109, please)

NEW HIGH PRODUCTION TYPE GUN DRILLING MACHINE



MACHINE SHOWN PRODUCES 400 PARTS PER 8 HOUR SHIFT

It drills 6 holes (.5102-.5107 diameter); to size within .0005, and to location within .001, AND, NO FURTHER OPERATIONS ARE REQUIRED. The existing Drill & Ream operations will produce only 75 parts, in an 8 hour shift.

IT'S BUILT TO HANDLE 3 TOTALLY DIFFERENT PARTS

Diameter of largest part handled is 12"—and, of the smallest part, 6". It can be converted, to handle one part or another, easily, in 3 minutes. It's possible to eliminate up to 6 machines, and save time and manpower.

AND, IT WILL HANDLE DOUBLE-FLANGE PARTS READILY

On double-flange parts, with an opening between flanges—up to 2"—high speed production is maintained by a jump feed, to cut down cycle time.

BUILT TO J.I.C. HYDRAULIC AND ELECTRICAL STANDARDS

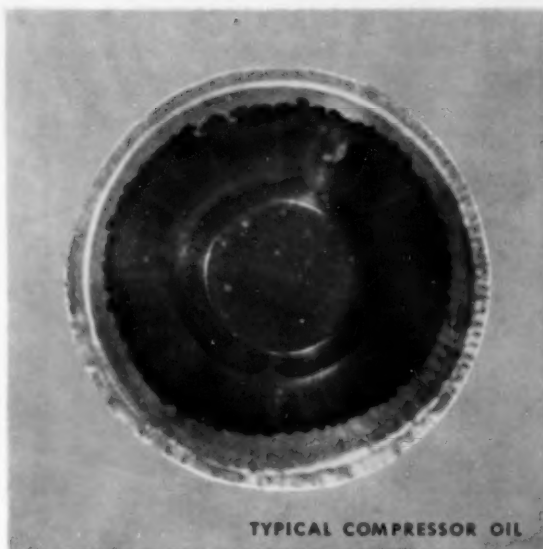
Automatic lubrication throughout. Hydraulically operated bushing positioning slides. High pressure coolant system provides rapid dispersion of chips from Gun Drill tips as well as lubricating drills. Designed, engineered and proved in actual plant operation.

We invite your inquiries regarding our full line of tapping units, and index tables, manual and automatic. Write for Catalog and Engineering Data Sheets.

Michigan

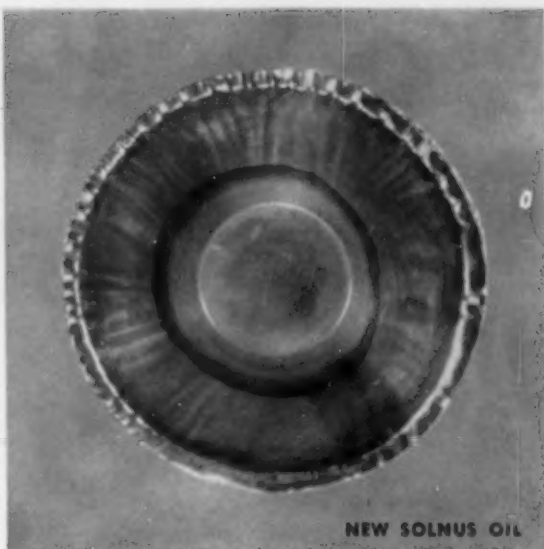
DRILL HEAD CO. Detroit 34, Michigan

engineers and manufacturers of production machines and drilling equipment



TYPICAL COMPRESSOR OIL

To demonstrate the comparative deposit-forming tendencies of compressor oils, two drops of a typical compressor oil were heated until evaporated. Notice



NEW SOLNUS OIL

the large deposit, *most of which is carbon*, left by the typical compressor oil. A new Solnus oil, after the same evaporation test, leaves a much smaller deposit.

NEW SOLNUS OILS HELP KEEP COMPRESSORS CARBON-FREE



THREE MINUTE TEST right at your desk shows why Solnus oils are the best for your compressors.

The chief enemy of air compressors is carbon build-up. The best way to avoid this hazard is to use the compressor oil that has the lowest carbon-forming tendency.

Sun's new Solnus oils have been proved to be ideal compressor lubricants. The minute amounts of carbon that form are fluffy and blow away easily . . .

assurance against dangerous build-up of carbon on valves and exhaust ports. Tear-downs for cleaning are kept to a minimum.

We'd like to show you, right on your desk top, the dramatic test pictured above. Ask your Sun representative about it the next time he calls or write **SUN OIL COMPANY**, Philadelphia 3, Pa., Dept. SI.

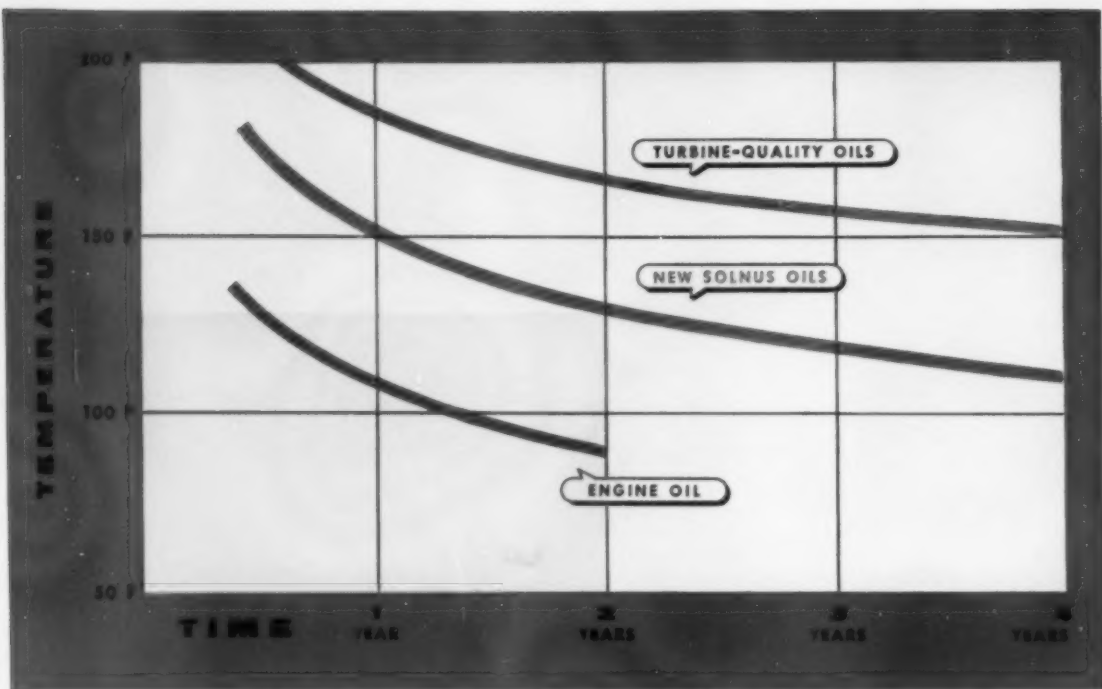
Please turn to the next page



INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: **SUN OIL COMPANY, LTD.**, TORONTO AND MONTREAL



This graph is based on 10% make-up per year and a 40-hour week.
The yellow area represents approximately 80% of all applications.

NEW SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

High grade lubricants for squirt-can prices . . .
New Solnus oils give more lubrication per dollar

The lubricated parts of most machines—our estimate is 80%—operate at temperatures below 130 F and the time between oil changes is less than 2 years. New Solnus oils were specifically developed to meet these operating conditions at the lowest possible cost.

The above graph compares the service life of new Solnus oils with that of an expensive, turbine-quality oil, and an oil of the type old-timers call "engine oil". The service life of the turbine-quality oil is excellent and probably covers 99% of all applications . . . but for a premium price! The engine oil has a very limited life. It cannot be used

safely, except for a very short time, at even moderately high operating temperatures, and it gives very little protection against rust and corrosion.

Now look at the service life of new Solnus oils. They easily meet the service requirements of at least 80% of all oil lubrication jobs and they sell for a squirt-can price! In addition, new Solnus oils are fortified to prevent both rust and oxidation . . . a feature usually found only in more expensive oils.

For the full story on new Solnus oils, see your Sun representative or write Sun Oil Company, Philadelphia 3, Pa., Dept. SI.



INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

PHILADELPHIA 3, PA.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

AUTOMATION News Report

(Continued from page 106)

In the future, additional equipment will be added and the company reports it will be doing twice as much with electronics within a year. A master standards file is being set up, and it will enable tabulators to provide a current picture of the load of each factory machine, for production planning. This system will keep closer touch with manpower, material and tool requirements, and utilize further the firm's unit parts cost system.

FOR WEAPONS SYSTEMS

The Air Force plans to build a huge electronic testing and flight simulation laboratory at Dayton. Reeves Instrument Corp. reports it will build the equipment, containing over 500 operational amplifiers. Such features as problem checking of programming as well as subsequent phases of computer performance, multiple time scales at the flick of a switch, and indications of optimum use of computer components will be built in. An automatic programmer will permit operators to perform large numbers of runs without manually resetting controls or parameters.

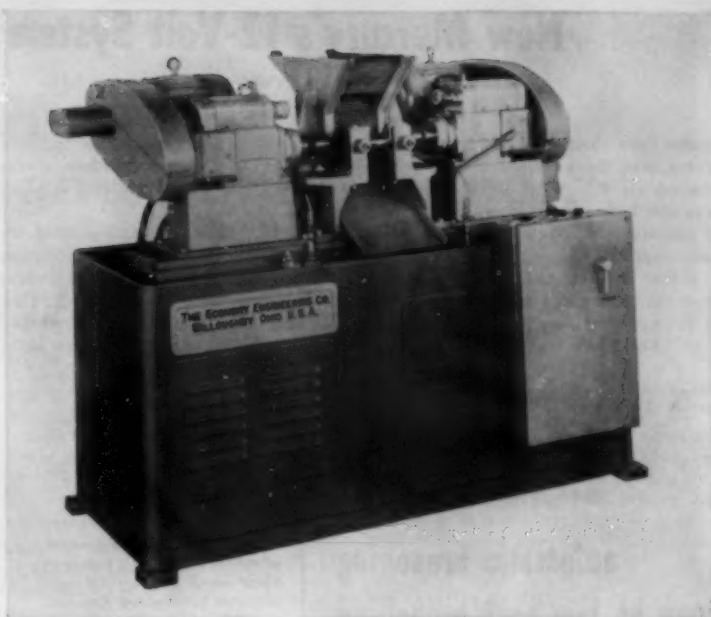
Another new Air Force installation, at the Arnold Engineering Development Center, will feature two automatic wind tunnel systems, and a data processing center. Consolidated Engineering Corp. is the systems supplier.

USING COMPUTERS

Using electronic computers to solve hydraulic problems will be a feature of the 11th Annual National Conference on Industrial Hydraulics on Oct. 27 and 28 at the La Salle hotel, Chicago.

BOOKS...

METAL STATISTICS 1955, published by American Metal Market, 18 Cliff St., New York 38, New York. Price, \$3.50. This is the 48th annual edition of a work which has no duplication in the western hemisphere. It has become the standard statistical reference book for the iron, steel and metal industries in Canada, the U. S., Mexico, and Japan. An examination will reveal that it contains up-to-date as well as historical records on production, consumption, stocks, imports and exports, monthly and annual market prices, and a great deal of valuable information on allied economic subjects.

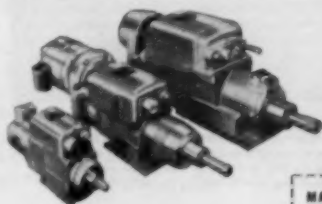


"Part per Second" ...automatically with Hartford Drill Units*

Economy Engineering Co., Willoughby, Ohio employs two Hartford Drill Units on their standard hopper fed double end machines to taper ream 60 valve push rod tubes per minute to close tolerances.

Use of Hartford Drill Units by this well known machine builder is typical of the

*Formerly produced under the trademark "Delta-Milwaukee" by the Rockwell Mfg. Company



HARTFORD

Special

way in which Hartford Standardized Components can bring the benefits of low cost automation to **every** manufacturer. The Economy machine can produce not only automotive push rods, but can perform practically any double end machining operation on rods and tubes...reaming...facing...threading...tapping...centering...drilling...chamfering...pointing, etc. **Any tool requirement is available with Hartford Air-Hydraulic Drill Units. Dial them all — rate of feed — distance of rapid traverse — spindle speed — final depth.** Take a tip from the Economy story, investigate Hartford components.

MACHINE TOOL DIVISION
THE HARTFORD SPECIAL MACHINERY CO. B-504-10
281 Homestead Avenue, Hartford 12, Conn.

☐ Have Field Engineer call.
☐ Send Application Data Sheet and descriptive literature.

Name _____
Company _____
Street _____
City _____ Zone _____ State _____

New Mercury's 12-Volt System and Engines

(Continued from page 59)

heater tube, one end of which communicates with the air cleaner to provide filtered air free from dirt. Carburetors also have improved venting which is particularly effective in high altitude operations.

Better breathing is obtained by increasing the rocker arm ratio to 1.54 to 1, thus increasing the valve lift on both intake and exhaust. Enlarging

the passages and ports in the cylinder heads results in a smoother, unrestricted flow of intake and exhaust gases.

A major improvement has been effected in the control of spark advance, making it possible to utilize borderline spark setting without knock. This has been done by adding a second diaphragm to the vacuum advance actu-

ating mechanism. It is directly connected to the intake manifold, responding instantly to changes in manifold depression.

The cylinder block has been redesigned to provide the necessary strength, cooling and clearances required for the greater engine displacement. The whole engine has been stiffened up and made more durable.

Engines are fitted with full flow oil filters and have the same setup of dual exhaust manifolding as last year. From a manufacturing standpoint, it is of interest that all of the design changes have been effected in such fashion as to utilize the same basic exterior dimensions, thus making it possible to machine the major elements such as the block and heads over the existing automation lines.

Incident to the new program the rear engine mounting is new; while front mounts have been fitted with rubber of different specifications.

A radiator of larger capacity and increased frontal area is used with air conditioning installations, whereas the standard radiator has increased capacity due to the addition of closer spaced fins. The compressor for the air conditioning system now employs an "off-on" solenoid type clutch mechanism.

Safety seat belts are offered as optional equipment, providing belts for six passengers. Among other safety features are: an optional instrument panel pad, and the adoption of a new type steering wheel in which the hub is mounted about 6-in. below the level of the wheel rim. It should be noted that this is not a "collapsible" wheel.

The 1956 models will all be equipped with the new sealed beam headlamps discussed so widely last year.

Apart from the engine, mechanical features remain substantially the same except for some items to be noted here. The brake system has been changed in detail by fixed anchoring of brake shoes and provision of only a single adjustment for lining wear.

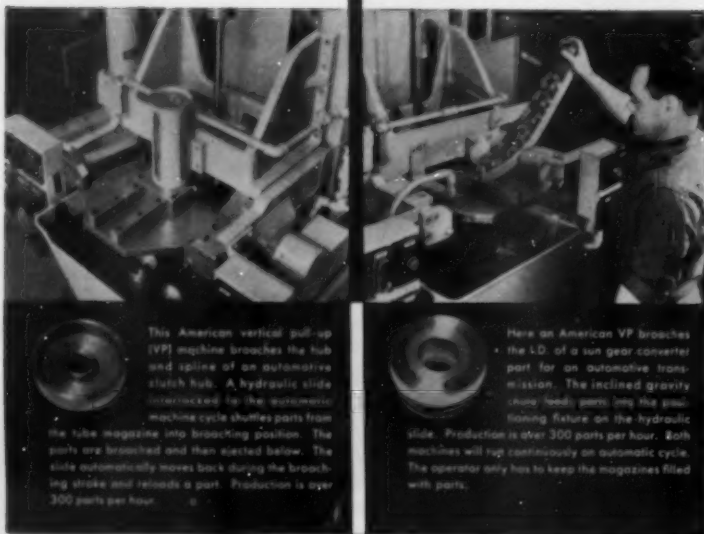
The Merc-O-Matic drive remains about the same except for some changes in valving designed to increase the cut-in speed from first to second, during kickdown, to 41 mph. In addition, one of the clutch members has an additional plate to handle the increased engine torque. One other item is a change in the geometry of the throttle linkage to the engine.

Naturally there is a variety of de-

automatic broaching can be low cost broaching the *American* way

The broaching operation can justify automatic set-ups on smaller volume jobs when the tooling is kept relatively simple and the cost low. Illustrated here are two American machines which feature:

1. Automatic cycle
2. Simple tooling
3. Magazine or chute feed



This American vertical pull-up (VPI) machine broaches the hub and spline of an automotive clutch hub. A hydraulic slide interlocked to the automatic machine cycle shuffles parts from the tube magazine into broaching position. The parts are broached and then ejected below. The slide automatically moves back during the broaching stroke and reloads a part. Production is over 300 parts per hour.

Here an American VP broaches the I.D. of a sun gear converter part for an automotive transmission. The inclined gravity chute feeds parts into the positioning fixture on the hydraulic slide. Production is over 300 parts per hour. Both machines will run continuously on automatic cycle. The operator only has to keep the magazines filled with parts.

Why not let American help you solve your broaching problems. Just send a blueprint or sample for a free estimate. American makes a complete line of broaches, broaching machines and fixtures. For further information on American VP internal broaching write for Catalog No. 401.

AMERICAN
American BROACH & MACHINE CO.
A DIVISION OF SUNDRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



FALLACIES AND FACTS FOR CARBIDE BUYERS

"Equivalent Grade" charts can mislead carbide users

Another blunt — but necessary — clarification by the
manufacturer of Carboloy cemented carbides shows
how these charts fail to disclose important facts.

Charts purporting to be "Equivalent Grade" or "Industry Standard" carbide comparison tables are now being liberally distributed in the metalworking industry. Both titles are misnomers.

Those who advocate their use claim or imply that:

1. These charts prove that a purchaser can safely interchange grades made by a number of manufacturers and get equal results on a given job.
2. These charts were compiled as a joint effort by all carbide manufacturers.

Neither statement is entirely factual.

THE FACTS ABOUT CLAIM NO. 1

The so-called "Equivalent Grade" charts are an attempt to convince carbide purchasers that any of the grades listed for a particular job will perform equally well. This is not in accord with the facts.

No two carbides are exactly alike in over all performance. Their production abilities vary tremendously because of differences in composition, metallurgical structure, manufacturing techniques, and quality control. For example, Carboloy Grades 883 and 44A have identical chemical composition. Yet because they are completely different structurally, they cannot be used as "equivalents."

Because no two carbides are exactly alike in performance, attempts to force them into arbitrary cubbyholes on the charts lead, inevitably, to poor machining results. The weakness of using the charts to select "equivalent" grades is easily demonstrated by two examples:

1. Carboloy manufactures four different cast-iron cutting grades to handle various conditions. Several other manufacturers have one or two grades to cover the same range. Now it is quite possible that competitive grades might work out in general, but in the specific areas covered by our four grades, they would not provide optimum performance. Yet all the grades are in the same classification on the charts . . . with no attempt made to distinguish their particular advantages.

2. Carboloy's new steelcutting Grades 350 and 370 do not fall under any of the general chart classifications. If included at all, Grade 370, for example, is usually

placed under the designations "C-5" and "C-6." Yet we know from experience that Grade 370 will give far longer tool life than our Grade 78B, which has the same classification numbers. Obviously, the two grades are not in the same category in terms of production ability. Yet the charts would lead purchasers to believe that they are "equivalent."

THE FACTS ABOUT CLAIM NO. 2

Despite anything to the contrary, these charts were not compiled as a joint effort by all carbide manufacturers.

Obviously, every carbide manufacturer should recommend the types of cutting applications each of his grades is designed to handle. This is part of his responsibility to the customer.

However, as far as the Carboloy organization is concerned, our recommendations stop with giving data about our own grades. We have compiled test and case-history information on them. We know exactly how they will perform. But we are not in the position to give similar data on other manufacturers' grades — nor is anyone else better qualified than ourselves to give data on our grades.

But several other carbide manufacturers have decided, apparently, to assume this responsibility. Their compilations — under the title of "Equivalent Grade" or "Industry Standard" charts — are now being widely circulated in the trade. The use of these titles may lead the carbide buyer to believe that the chart has been agreed to by all manufacturers. This emphatically is not the case.

AND, THE GREATEST FALLACY

Unlike steel, which can be changed somewhat by heat-treating or other operations after it is delivered, the properties of carbides cannot be altered.

This means the purchaser should know exactly what he is buying . . . and that he should insist on a carbide with consistent production ability.

The important factor of consistent operation is not covered in any way by the so-called "equivalent charts." And this, we feel, is perhaps the most important fact not brought to the attention of the carbide user who relies on the charts when specifying grades for his job.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11151 E. 8 Mile Ave., Detroit 32, Michigan

Carboloy Created-Metals for Industrial Progress



"I recommend

Genuine Leather

because style counts for a lot

when you're selling Oldsmobiles."

Mr. Raymond F. Scott
Oldsmobile
Wynnewood, Pa.



"My customers take performance for granted when they're buying an Oldsmobile. What they are looking for is style and beauty. They get that—plus performance—when they choose one of the models upholstered in genuine leather. Leather is not only stronger, longer-lasting, and easier to care for—it is also the top of upholstery style."

Impartial tests back up what Mr. Scott says. Genuine leather upholstery is 77% stronger than the next-best upholstery material.

THE UPHOLSTERY LEATHER GROUP, INC.
141 East 44th St., New York 17, N.Y.
99 West Bethune, Detroit 2, Mich.

Only genuine leather wears as well as it looks

YOU CAN GET THE FACTS THAT PROVE LEATHER IS BEST. Send the coupon today for "All About Genuine Leather" (free), showing results of tests by a famous impartial testing company.

THE UPHOLSTERY LEATHER GROUP, INC. Dept. AI-1
141 East 44th Street, New York 17, N.Y.

Please send me, free, your "All About Genuine Leather".

Name

Firm

Address

City Zone State

tail changes incident to the introduction of new models. A sampling of some additional items of interest is listed here. A fuel tank filter with a woven Saran plastic screen now is standard. Shock absorber valving has been calibrated. Safety door locks which remain locked upon considerable impact have been adopted as standard.

Surprising as it may sound, Mercury engineers have developed a convertible frame with a lighter X-member. Contrary to previous experience the less rigid frame reduces shake materially.

Body engineers have been busy with the result that 1956 Mercury bodies will have more sound deadening insulation added at every conceivable point to effect quietness. Special heat insulation is provided about the muffler. Aluminum foil is attached to the floor pan in the area immediately above the muffler while the muffler itself is wrapped with a light covering of asbestos.

New Heater

(Continued from page 57)

the heater's ignition transformer. Car temperature is controlled by the thermostat, mounted in a distribution plenum chamber, which cycles the heater rapidly from ON to OFF. There is an additional top-limit safety switch.

The fuel pump, driven by an electric motor which also drives the combustion air blower, is of the diaphragm type operating with a stroke of 0.040 in. and operates at 25 psi. Current consumption was given as 60 watts.

Maximum output of heater is said to be about 32,000 Btu per hr and to provide enough instant heat for very rapid warm-up or extremely rigorous operating conditions, such as sub-zero temperatures in combination with high road speeds. It is estimated that only about one-third of maximum capacity will be most generally utilized.

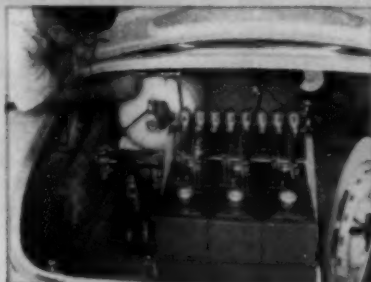
Exhaust from the heater combustion chamber is by a separate outlet.

Fuel consumption at maximum output is stated to be about one-third gallon of gasoline per hr. At normal cycling in maintaining a comfortable temperature in the vehicle, average fuel consumption is estimated to be one-ninth gallon per hr of heater use.

The heater components are said to be designed and tested for 1000 hours minimum life, and other major components to have a life greatly in excess of this value:



The arrow is pointing to the Du Pont test car's fuel-injection pump, which is driven by the same shaft as the distributor.



From these tanks in the trunk, any of six different fuels can be selected for testing in the fuel-injection engine.



Fuel-injection car being tested on Du Pont Petroleum Laboratory's chassis dynamometer.

Special DuPont test car studies advantages of *fuel-injection*

Will fuel-injection soon replace our standard carburetor system? As yet, no one knows the answer! But there are certainly many advantages to recommend it . . . such as freedom from carburetor icing, reduction of vapor lock troubles and improved power. And it will permit automobile styling changes since the hood lines can be lowered.

But how would a trend to fuel-injection engines affect the refiner? As a large supplier of the chemical additives used to improve fuel performance, we at Du Pont are interested in this development. And to study it thoroughly, the Du Pont Petroleum Laboratory is using a specially equipped test car.

The car has a Lincoln V-8 engine

to which has been added an American Bosch fuel-injection system and special instrumentation. In addition to road work, the Petroleum Laboratory has tested the car on the Laboratory's chassis dynamometer.

From testing it with a variety of gasoline blends, the Laboratory has found that *fuel-injection permits greater flexibility in blending fuels. Fuel components with higher vapor pressures can be used, and it is possible that increases in the use of higher end point fuels may be practical. These wider tolerances could result in signif-*

icant economic advantages to refiners, as well as welcome benefits to the motoring public.

The Du Pont Petroleum Chemicals Division now has this car on a demonstration tour throughout the United States.



Better Things for Better Living
... through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

Regional
Offices:

NEW YORK, N.Y.—1270 Ave. of the Americas . . . Phone COlumbus 5-2342
CHICAGO, ILL.—8 So. Michigan Ave. Phone BAndolph 6-8630
TULSA, OKLA.—P.O. Box 730 Phone LUther 5-5578
HOUSTON, TEXAS—705 Bank of Commerce Bldg. Phone CApital 5-1151
LOS ANGELES, CALIF.—612 So. Flower St. Phone MAdison 5-1691

IN CANADA: Du Pont Company of Canada Limited—Petroleum Chemicals Division, 80 Richmond St. W., Toronto 1, Ont.
OTHER COUNTRIES: Petroleum Chemicals Export—Nemours Building, 6539—Wilmington 98, Delaware

ON OUR WASHINGTON WIRE



Numerous industrial and military uses are seen for a new dry lubricant and corrosion preventive developed as a result of basic studies by the Navy. The material is in the form of a plastic film applied only a few ten-thousandths of an inch thick.

Office of Defense Mobilization will permit 34 new or expanded facilities costing \$20.6 million to be built under the fast tax amortization program. They will be for applications filed prior to the current review of the system, ODM has stated.

Senate subcommittee is to determine what new car dealers think about automobile marketing factors. Answers to questionnaires mailed to some 40,000 car retailers will help to determine whether the congressional group will open a full-scale investigation of automobile distribution practices before winter.

Concerns that have never supplied equipment to the Government before are now accounting for one out of every three contracts awarded by the Defense Dept. The former Pentagon practice of maintaining a more-or-less static list of suppliers has been discarded.

Outlook for military ordering in the current fiscal year is for an increase over last year's \$16 billion. Pentagon chiefs won't make an official estimate now.

Continued upswing in the share of military contracts awarded to small companies is reported by the Pentagon. In the January-May period, the average share of net awards accruing to small business was 25.5 per cent.

National Air Show

(Continued from page 70)

Lord Mfg. Co., bonded rubber engine mountings; Sundstrand Co., constant speed drives; and Arma Div., American Bosch Corp., gyro wheels.

Also: Hamilton Standard Div. of United Aircraft Corp., hydraulic pumps, 18-lb jet air conditioning unit, and propellers; Cleveland Pneumatic Tool Co., landing gears and actuators; Caterpillar Tractor Co., electric sets and Diesel electric equipment; Consolidated Diesel Electric Corp., ground support vehicles; Aluminum Co. of America, airframe and wing components; Houdaille-Hershey Corp., vibration control and hydraulic equipment; and Remington Rand, scale model of Univac system and auxiliary equipment.



SOLID CHUCKING REAMERS



EXPANSION REAMERS

each a specialist
in cost cutting

Staples

CARBIDE-TIPPED CIRCULAR TOOLS

Your economy begins — and work quality improves — when you specify Staples carbide-tipped circular tools. They have established an enviable reputation throughout industry for delivering top-profit performance on every job.

A complete range of standard tool designs and sizes is available for quick delivery from stock. For your special tools, submit your specifications and prints for a prompt quotation. You'll be making the most of your standard and special tool investment when you put Staples Tools to work in your production.



SHELL-TYPE EXPANSION REAMERS



CORE DRILLS



STUB SCREW MACHINE REAMERS (SOLID AND EXPANSION TYPES)



SHELL END MILLS



END MILLS



COUNTERBORES, SPOTFACES

Staples

CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide-Tipped Tools, Expansion Reamers — Special Tools

Write for the Staples Standard Tool Catalog

THE STAPLES TOOL COMPANY, CINCINNATI 25, OHIO

How Alloy Steels Are Affected by Molybdenum

There is nothing hit-or-miss about the making of alloy steels. Each element in a given analysis is chosen for its ability to do a special job—or to complement the abilities of other elements. Previously in this series of discussions we have briefly outlined the functions of nickel and chromium. This leads us naturally to molybdenum, a highly reliable performer in numerous types of analyses.

Because of its many desirable properties, molybdenum is one of the most respected of all the alloying agents. It is often used in conjunction with chromium, manganese, nickel, cobalt, tungsten, vanadium, or various combinations of these elements.

Molybdenum promotes hardenability in steel, and is useful where close hardenability-control is essential. It increases depth-hardness and widens the range of effective heat-treating temperatures. Moreover, it has a strong tendency to form stable carbides that hamper grain-growth prior to quenching, thus making the steel fine-grained and unusually tough at the various hardness levels.

Another point in favor of molybdenum is its ability to increase the tensile and creep strengths of alloy steels at high temperatures. Still another is its talent for enhancing corrosion-resistance in high-

chromium and chromium-nickel steels.

Among the familiar products that frequently contain molybdenum are high-speed cutting tools, forged crankshafts and propeller shafts, turbine rotors, high-pressure boiler plate, high-pressure cylinders, permanent magnets, and armor-piercing projectiles. This is by no means intended as a complete list, but rather as a few typical examples.

If you would like more information about the properties and applications of molybdenum, Bethlehem metallurgists will be glad to help you. Our staff technicians have devoted years of research to the subject, and working with molybdenum is part of their job. As a matter of fact, they are specialists in all types of alloying elements, and all types of alloy steels. When they can be of assistance to you, please feel free to call them.

And call on Bethlehem, too, when in the market for AISI standard steels, special-analysis steels, or carbon grades. Your inquiries will be welcomed, and we can assure you of prompt service.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributors: Bethlehem Steel Export Corporation



BETHLEHEM STEEL

New Jets and Airliners AT FARNBOROUGH EXHIBITION

(Continued from page 52)

now undergoing intensive development and described as opening up even wider tactical roles for this plane. The other was the ground attack Mark IV with under-wing attachments for bombs or rockets and extra fuel tanks.

Another variant of an existing air-

craft was the English Electric Canberra P.R.9 designed for long-range photo reconnaissance at extreme altitudes. This has a larger wing and is fitted with up-rated Rolls-Royce Avon engines.

The Avro Vulcan delta-wing four-jet bomber gave an impressive dis-

play of its structural strength and handling qualities. The test pilot slow-rolled this big Olympus-engined aircraft during a climb with surprising smoothness. It is claimed that no aircraft of comparable size has ever achieved this maneuver before. A Canadian Avro CR-100 likewise went through unprecedented aerobatics, with an outside half-loop, falling leaf, and spin.

The Shackleton M.R. III sea reconnaissance and anti-submarine aircraft, also built by A. V. Roe, made its maiden flight three days before the air show opened. Like the earlier models, this is powered by four Rolls-Royce Griffon piston engines, but includes several new features designed to improve operational efficiency. Among them are a tricycle undercarriage, modified cockpit canopy giving better visibility, sound-proofing of the wardroom, and greater fuel capacity provided by the addition of wing-tip tanks.

Among the helicopters, attention was focused on the Fairey Ultra-Light. This pint-sized machine is driven by a Blackburn-Turbomeca Palouste gas producer which supplies compressed air to the tip-jets of the two-bladed rotor. The exhaust blast provides forward propulsion. It is directed against the rudder carried on a trailing beam. Pilot and observer sit facing in opposite directions in the transparent cabin, thus getting a 360 deg field of vision. Details of the machine are classified, but an idea of its weight and size is suggested by the report that it can be carried on a three-ton truck.

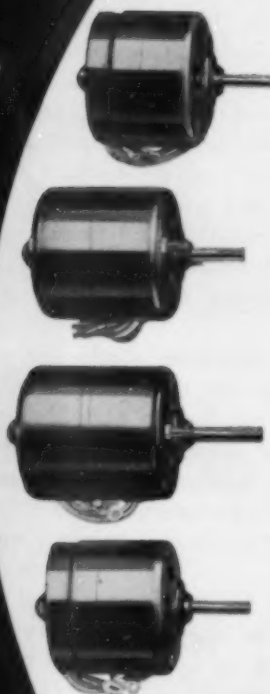
Fairey showed off its second prototype Gyrodyne, whose rotor is spun by a compressor driven from an Alvis Leonides piston engine. Fuel is mixed with air at the pressure jets where it burns. Pusher airscrews on the stub wings provide forward motion. At Farnborough it demonstrated conversion from helicopter to autogyro while airborne.

The Gyrodyne is the precursor of the much larger Rotodyne which Fairey expects to fly by mid-1956. This single-rotor transport has a payload capacity of 11,000 lb, with 3300 cu ft of unrestricted cabin space for 44 passengers or the equivalent cargo. A pair of Papier Eland turboprops will give an economical cruising speed of 150 mph with a range of 250 miles. Two prototypes of the Rotodyne are being built.

Bristol is also preparing an anti-submarine helicopter of comparable size, the twin-rotor 191, to be powered initially by a pair of Alvis Leonides

**Leece-
Neville**
... a reliable
source for
SMALL MOTORS
in **LARGE**
VOLUME

for • HEATERS • WINDSHIELD WIPERS
• DEFROSTERS • SEAT ADJUSTERS
• AIR CONDITIONERS • CAR COOLERS
• PUMPS • WINDOW REGULATORS
• MARINE VENTILATORS



Leece-Neville Small Motors are produced for automotive use in 6 volt to 32 volt systems. Higher voltage motors are available for other applications. For full information, write The Leece-Neville Company, Fractional H. P. Motors Division, Cleveland 13, Ohio.

**YOU CAN
RELY ON**

**Leece-
Neville**
AUTOMOTIVE ELECTRICAL EQUIPMENT
SINCE 1909

Major 850 hp engines, and later by BE 32 turboprops. This is being developed from the experimental 173 whose individual rotor gearboxes are linked by a synchronizing shaft in the fuselage roof. This permits phasing of the counter-directional rotors, and continued operation in the case of one engine failure.

The five-passenger Westland Widgeon was another debutante at Farnborough. This succeeds the S-51 Dragonfly which is of Sikorsky design made under license in Britain. Nose and cabin have been altered, and a completely new transmission system installed. Ambulance and rescue versions are planned. Overall length is 41 ft 2 1/2 in., empty weight 4424 lb, maximum level speed 95.5 mph, and power plant is an Alvis Leonides piston engine.

Following the growing demand for large rotary-wing transports, Westland has announced its preparations for building a 40-passenger craft. Designated as the Westminster, it will have a single main rotor driven by a pair of gas turbines. Laden weight will be 33,000 lb and cruising speed about 145 mph.

Seeking to combine the advantages of the helicopter with the higher speed and lower operating cost of fixed-wing aircraft, Scottish Aviation has produced the entirely new Twin Pioneer. This 14/16 passenger transport is designed for terrain conditions which limit airfield size and restrict approaches. It requires a take-off run of only 75 yd, can land in 66 yd in still air, has a speed range of 40 to 180 mph, and stalls at 36 mph with engine on and flaps down. Basic flying cost is said to be less than 2¢ per passenger mile, and maximum range at 124 mph with 3000 lb load is 620 miles.

Operation in confined spaces with steep climb and descent angles is made possible by full-span slats on the wing leading edge combined with large Fowler-type flaps. These are controlled by a hydraulic ram linked to a system of chains and torque tubes. This arrangement was adopted from the smaller Prestwick Pioneer, and the two aircraft, in fact, have a very high proportion of parts in common.

The Twin Pioneer has a span of 76 ft 6 in. and is 45 ft 3 in. long. A triple tail assembly is used in view of the unusually low airborne speeds. Undercarriage is non-retractable. Power is from a pair of 520 hp Alvis Leonides engines. It is understood that 200 of these machines are scheduled for early production.

Another new commercial plane on show was the Herald — Handley Page's bid for the Dakota replacement market. This was seen at Farnborough last year only as a fuselage mockup, and had its maiden flight in August. Delivery of production aircraft is expected to start late in 1957, and so far 29 have been ordered by operators in Australia and South America.

In the field of longer-range passenger aircraft, British industry is clearly striving to exploit the success of the turboprop pioneered by the Vick-

ers Viscount. Napier had fitted a pair of 3000 hp Eland engines to an Elizabethan, thereby effectively raising the speed of this high-wing 47-seater by 50 mph to a maximum of 280 mph, increasing its climb, and extending its range to 900 miles. During the flying display the Eland Elizabethan demonstrated single-engine take-off and climbs, a windmilling engine start, an engine cut and relight, and acceleration from idling to full throttle in three seconds. It was emphasized that this was not a test bed, but a new installation put-






PACKAGE DELIVERY, NEWSPAPER, LAUNDRY, GUT CLEANING

MILK TRUCKS, BAKERY TRUCKS

CONSTRUCTION EQUIPMENT

TAXI, POLICE, OTHER PASSENGER CARS



MOTOR FREIGHT



ALL UTILITY COMPANIES
Electric, Phone, Gas

Now EVERY Fleet in America can afford *Leece-Neville* Alternators

SENSATIONAL LOW PRICE ON NEW L-N ALTERNATOR SYSTEM

The new Leece-Neville Alternator brings to fleets of passenger cars, light and medium trucks all the famous advantages that larger L-N Alternators have proved by performance for over nine years: charging current with engine idling, high output, low maintenance cost. Plus new, simplified bracketing. Yet the new L-N Alternator System actually costs less than "extra" output d. c. generators.

L-N ALTERNATORS FOR EVERY APPLICATION

There's a right L-N Alternator for every fleet unit. Capacities range from 60 amps for 6-volt systems to 180 amps for 12 volt. L-N Alternators will keep your fleet on the job and out of the repair shop. Why not get the whole story? Just write The Leece-Neville Company, Cleveland 14, Ohio. Distributors in principal cities . . . service stations everywhere.



ON YOUR NEW UNITS SPECIFY LEECE-NEVILLE EQUIPMENT,
FACTORY-INSTALLED

YOU CAN
RELY ON



ALTERNATOR SYSTEMS • GENERATORS
STARTING MOTORS • REGULATORS • SWITCHES
FRACTIONAL HP MOTORS


PASSENGER


BUS


DIESEL


INDUSTRIAL



OFTEN

TWO HEADS ARE BETTER THAN ONE



Sometimes a double-headed part or fastener is the **LOWEST COST** and **FASTEST** solution to your assembly problem. This special shown at the left is a good example. Pointed, machine threaded, center collar stop, large drive head with a slot. Make this any way but cold-headed and it would cost a fortune! But **HASSALL** made it . . . **FAST** and at **LOW COST**.

Double-heading is only one example of the almost limitless possibilities Hassall cold-heading offers you. If you have a fastener problem just send us samples or specifications for a quotation.

WRITE FOR CATALOG with it we will send you our popular decimal equivalent wall chart. John Hassall, Inc., Box 2194, Westbury, L. I., N. Y.

HASSALL

SINCE 1850



NAILS, RIVETS, SCREWS
AND OTHER COLD-HEADED
FASTENERS AND SPECIALTIES

ting fresh life into a tried airframe which first flew in 1947. British European Airways expect to run it on freight services next summer.

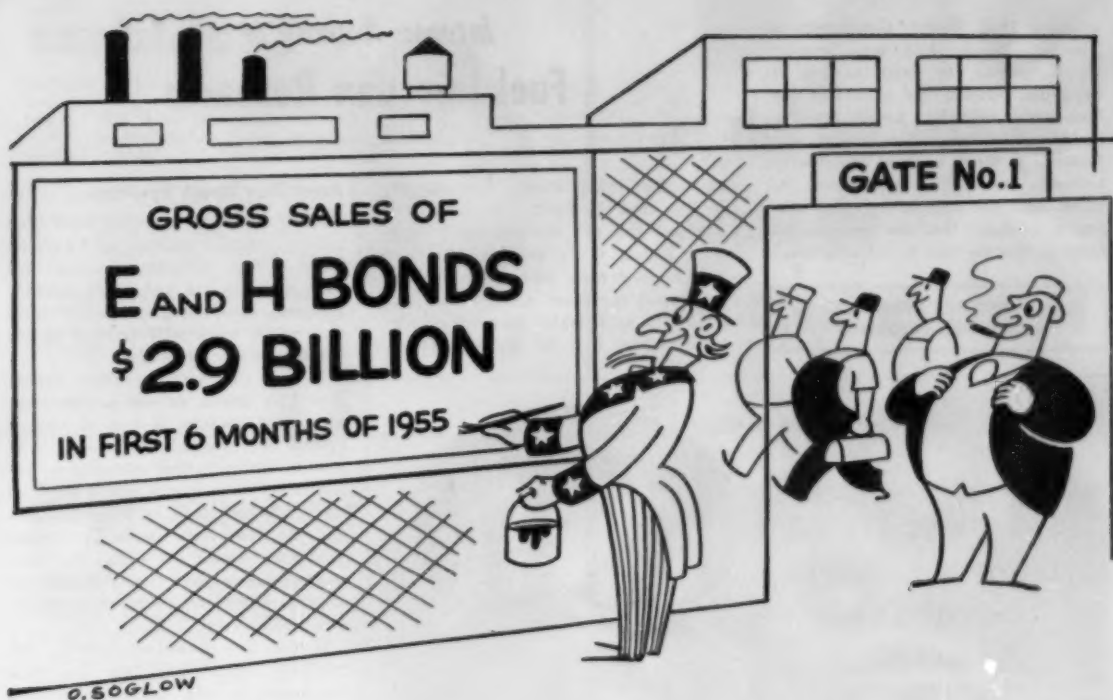
The Britannia Mark 100, with four Bristol Proteus 705 turboprops of 3780 ehp, was put through exacting paces. Fifteen of these aircraft have been ordered by BOAC and will be put on its South African routes next spring. Long-range models are also being prepared. The Mark 300 LR, with fuselage lengthened 10 ft 3 in., is powered by Proteus 755 engines developing 4120 ehp and 1320 lb thrust, driving 16 ft diameter de Havilland 4-blade hollow steel propellers. Range of this version, carrying 101 passengers, with a capacity payload of 28,000 lb, is 4600 miles with additional wing tanks. Maximum cruising speed is 392 mph. The Britannia is in full production at Filton, Bristol, and a second line is being set up by Short Bros. & Harland at Belfast. Current trials of the Mark 100 include flights to Johannesburg, North Africa, Bombay and Karachi, and it is hoped that a Certificate of Airworthiness will be granted before the end of this year.

Meanwhile, however, de Havilland is pushing ahead with the Comet. At the show the Comet 3 gave an airborne demonstration. This prototype has been test-flown without interruption, and is described as an abridgement of all experience and information garnered from the earlier models and their unfortunate failures. It is a stepping-stone to the Comet 4 which will have four Rolls-Royce Avon RA-29 engines of 10,500 lb thrust and a gross weight of 152,500 lb. Deliveries are expected to begin by the end of 1958.

Several new developments of interest were seen in the indoor exhibition. De Havilland displayed a new 14-ft propeller having four solid aluminum blades. Operating features include constant-speeding, feathering, automatic pitch-coarsening, reversing, hydraulic pitch-locking, electro-thermal de-icing, and an electro-hydraulic safety stop. This airscrew is designed for high-powered turbine engines such as the Rolls-Royce R.B.109.

The Ministry of Supply gave a wind-tunnel demonstration of the latest jet flap idea. Here the jet or effluent is discharged through slots along the wing trailing edge. Greatly increased lift at low speeds is said to result when this sheet of exhaust is inclined downwards, thereby permitting slower take-off and landing speeds. In normal flight the blast is issued horizontally.

Just before the show Napier an-



If you are the man who is responsible for installing and promoting the Payroll Savings Plan in your company—

If you are one of the eight million Payroll Savers who buy Series E Bonds *every month* through the Payroll Savings Plan—

If you are one of the rapidly growing number of businessmen who are building for retirement through the consistent purchase of Series H (current income) Bonds—

You can well be proud of these figures:

- January to June '55 sales of E and H Bonds were the best in ten years—\$2.9 Billion—a gain of 13% over 1954, 28% over 1953.
- Since January 1, *cash value* of E and H Bonds outstanding *increased over a Billion Dollars*; value, \$39.3 Billion, an *all-time high*.
- Sales exceeded redemptions (matured and unma-

tured bonds) by \$493,716,000.

- Current income H Bond sales averaged more than \$100 million a month.
- January-June sales, E and H Bonds, represented 51.9% of the 1955, \$5,500,000,000 Sales Goal.

What's good for America is good for business—*your business*. If your company does not have the Payroll Savings Plan . . . or if you have the Plan and employee participation is less than 50%, phone, wire or write today to Savings Bonds Division, U.S. Treasury Department, Washington, D.C. Your State Sales Director will contact you promptly. He will show you how easy it is to install the Payroll Savings Plan or boost participation over the 50% mark through a simple person-to-person canvass that will put a Payroll Savings Application Blank in the hands of every employee. That's all you have to do. Your personnel will do the rest.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

AUTOMOTIVE INDUSTRIES



nounced that Power Generators of Trenton, N. J., had been granted U. S. rights to manufacture its Spraymat system for electrical surface-heater de-icing. As displayed on the Napier stand, this is a method of forming a metal element sandwiched between two insulation layers. All three coats are applied by spray gun, and it is stated that the aerodynamic form of the surface is not affected.

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**

Hardened and Ground Parts are our Specialty

This king pin is truly king-size: 8" long and weighs about 12 lbs. We machined it out of No. 3140-2½" bar steel. After heat treating, bearing surface was given the specified fine finish-grind to 2½" dia., $\pm .000$ — .001.

Parts like this are our specialty—we've been making them exclusively for the automobile industry for more than 40 years. Each year has added to our knowledge and skill in precise machining, scientifically-controlled heat treating and micro-finish grinding. Let us show you what we can do with one of your tough jobs. Write or wire.

Henry W. Brown
PRESIDENT

Experienced production on:

King Pins • Wheel Studs
Shackle Bolts • Shackle Pins
Brake Anchor Bolts
Countershafts • Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
5th-Wheel Rocker Shafts
Water Pump Shafts
... anything in the hardened and
ground line, of any analysis steel,
up to 4¼" diameter.

THE BROWN CORP.

213 BELLEVUE AVE.

SYRACUSE, N. Y.

C. N. Elmer, 2027 Cleveland Rd., Cincinnati • N. F. Spring, 4718 Bellvue Rd., Detroit • R. C. Sanderson, 6031 N. Ashland Ave., Chicago • Harry J. Winkler, 1704 Carhart, Fort Worth • Lyle M. Bennett, 1704 Washington Blvd., Los Angeles, Calif. • John S. Hunt, 2071 N.E. Vanhook St., Portland, Ore.

Intense Activity in Fuel Injection Research

(Continued from page 56)

at various other intermediate speeds.

Now that du Pont's petroleum lab has put the car through its laboratory paces, it is sending the test vehicle on a road tour. On this tour interested personnel will have an opportunity to examine this fuel injection system and its characteristics.

American Bosch Systems

Many hours of test time have been put on injection systems by American Bosch. This company has worked with units on six and eight cylinder engines. Bosch engineers have also done much work with several of the automobile manufacturers.

One of the main problems facing American Bosch, as well as the other equipment makers, is cost of such a system for original equipment. It is known, however, that carburetors are becoming more complex and likewise more expensive. With this in mind and the fact that ample production quantities would cut costs, the companies believe that fuel injection on original equipment is more a reality today than ever.

If used as optional equipment, fuel injection makers say that the price increment, if any, should be modest in comparison with those for other options such as automatic transmissions, power steering, power windows, etc. As American Bosch puts it, "The only question seems to be—will the advantages of fuel injection be similarly recognized?"

American Bosch reports that much work is being carried out on the simplification of equipment. Along this line, the company recently brought out an entirely new pump. Since the pump is of paramount importance, most of the research centers around that element.

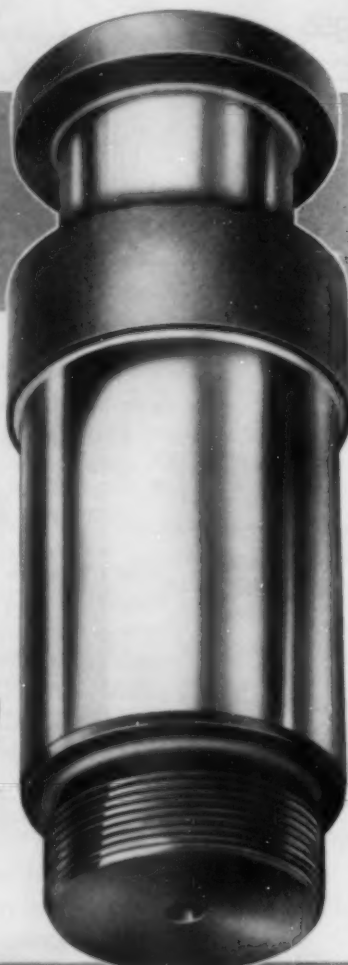
The small and simplified single-plunger pump with sleeve control may be driven directly from the side of the engine distributor.

Bendix and Thompson Products

Neither Bendix nor Thompson wants to do much talking about their fuel injection work at this date. Both are doing a considerable amount of research. Thompson Products is looking at both high pressure and low pressure (dribble system) units. Bendix, it is believed, is working with low pressure units.

Roosa Master

Hartford Screw Machine, makers of Roosa Master fuel injection equipment, have brought out a new pump which can be used for gasoline engines. This pump, the type D, is a single-cylinder, opposed-plunger, inlet-metering distributor type.



carbides?

IMPELLER HUB — 4" diam., 1 1/4" long, from SAE 1146 annealed steel forging. **JOB ANALYSIS** determined multiple-spindle chucks with **ALL CARBIDE** tooling.

11 operations on first side, on 6" Acme-Gridley 8-spindle chuck with double indexing and duplicate tooling. 2 pieces per cycle in 22 1/2 seconds machine time — 320 pieces per hour.

17 operations on other side on single indexing 6" Acme-Gridley 8-spindle chuck. 26 seconds machine time — 138 pieces per hour.



high speed?

SEAL RING — 1/2" thick, from 2 1/2" diam. steel 6150 annealed. **JOB ANALYSIS** classed this as single-spindle job with HSS tooling.

5 shoulders rough and finish-formed to .002 tolerance, seat diam. held to .0005 tolerance, on 3 1/2" single-spindle Acme-Gridley bar-type turret lathe. 7 minutes machine time — 8 (plus) pieces per hour.

Spindle speed automatically changed 4 times during cycle to provide suitable speeds and feeds for required finish.



or BOTH?



SHAFT — 7 1/4" long, from 1 1/2" diam. steel 6250 annealed. **JOB ANALYSIS** indicated single-spindle bar-type turret lathe, with part **CARBIDE** and part HSS tooling.

10 operations including deep forming, turning and form-turning on 3 1/2" single-spindle Acme-Gridley bar-type turret lathe: 5 minutes 46 seconds machine time — 9 (plus) pieces per hour.

5 automatic changes of spindle speed during the cycle provided speeds and feeds best suited for using both HSS and Carbide tools.

let the job analysis dictate the right tooling method

(And the Right Machine)

All Acme-Gridleys are built with a rigidity factor to withstand the pressure of any cutting tool yet devised—at speeds as fast as modern cutting tools can "take it." With such a margin of power, speed and stamina built into each of National Acme's **COMPLETE LINE** of multiple- and single-spindle bar and chuck-type automatics, you can safely let the *economics* of the job dictate:

1. The best tooling method.
2. The machine best suited to produce the job most economically.

And you can be equally sure that tooling recommendations from National Acme will be based upon sound, experienced judgement.

If you would like a complete job analysis, we'd be glad to give you the benefit of our experience.



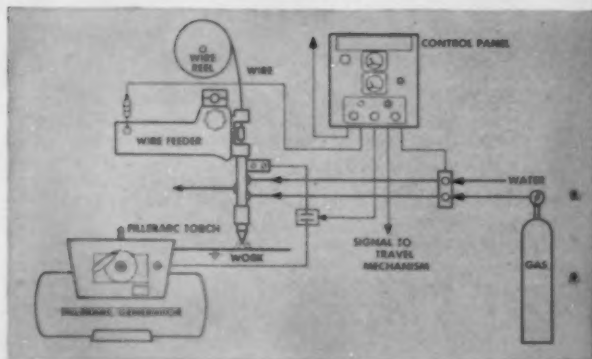
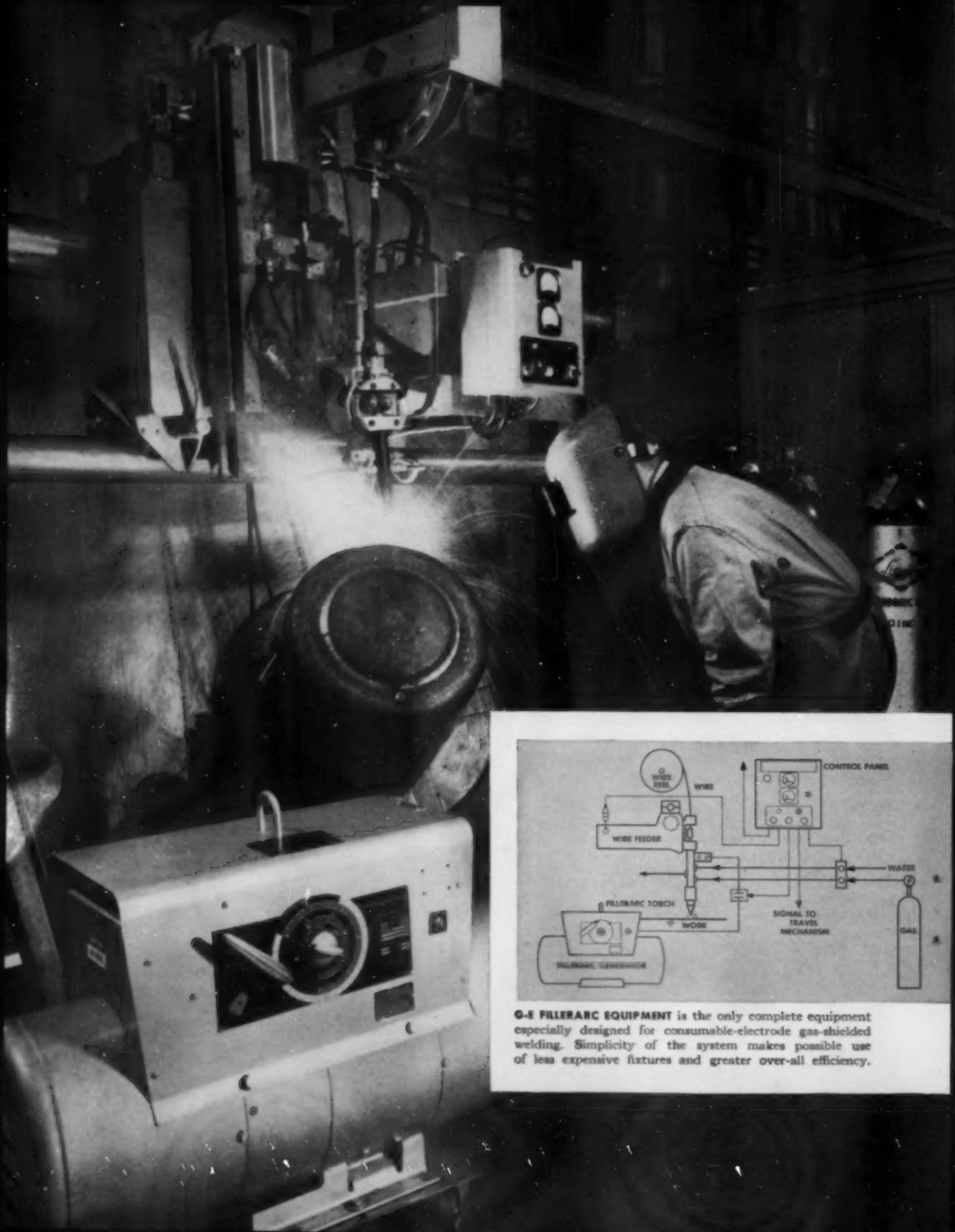
OUR JOB: to provide the *Right Machine* for YOUR JOB

**THE NATIONAL
ACME COMPANY**

173 EAST 131st STREET • CLEVELAND 8, OHIO



Acme-Gridley 4, 6 and 8 Spindle Automatic Bar and Chucking Machines • Fully Automatic Turret Lathes (Bar and Chuck Type) • Hydraulic Thread Rolling Machines • Automatic Threading Tools • Swathes • Grinders • Cylindrical Grinding Machines



G-E FILLERARC EQUIPMENT is the only complete equipment especially designed for consumable-electrode gas-shielded welding. Simplicity of the system makes possible use of less expensive fixtures and greater over-all efficiency.

NEW G-E Automatic Welding System Uses CO₂ to Slash Gas Costs 95%

FILLERARC... first complete equipment designed especially for automatic gas-shielded welding; combines unique generator with low-cost carbon dioxide—for sound welds on mild steel.

General Electric's new Fillerarc Automatic Welding Equipment brings you—not only 95% savings in shielding-gas costs—but **sound welds on mild steel**. The great savings possible through use of CO₂ as a shielding agent have long been recognized—but good mild steel weld quality has never been obtained. Now, after two years of successful application of Fillerarc equipment on non-ferrous metals (using inert gas), G-E engineers bring you the total solution for mild steel welding—**savings plus high quality**.

95% SAVINGS ARE POSSIBLE because CO₂ costs only 1/20th as much as inert gas. For the average job, Argon would cost \$5.00 per hour, CO₂ only twenty-five cents. This means yearly savings per equipment may be as high as \$20,000 on a 3-shift, 60% duty cycle basis. This new G-E system can now replace the submerged arc method on many jobs and eliminate many of the problems associated with granular flux.

EXCLUSIVE G-E GENERATOR practically eliminates the erratic weld quality formerly obtained with CO₂. Here's why: Only the G-E Fillerarc generator—with its exclusive **rising** volt-ampere characteristic—supplies an arc length which always remains constant, even with adjustments in wire speeds. This means minimum weld porosity and spatter—and deep penetration for extra-strong welds.

COMPARED TO OTHER INERT-GAS SYSTEMS, G-E Fillerarc equipment...

- Reduces gas costs 95%, for yearly savings up to \$20,000 per equipment;
- Delivers consistent weld quality because of the unique G-E Fillerarc generator;
- Assures constant speed; system is insensitive to normal line-voltage changes;
- Provides wire-feed speeds as high as 1000 I.P.M.

COMPARED TO FLUX-SHIELDED METHODS, G-E automatic Fillerarc equipment...

- Deepens penetration with low-cost CO₂;
- Provides a visible arc for full control of weld quality, permits less expensive fixtures;
- Does not use abrasive flux—especially important in welding compressor housings and similar jobs;
- Eliminates stubborn flux slag; cleaning costs are greatly reduced;
- Eliminates expensive flux recovery systems.

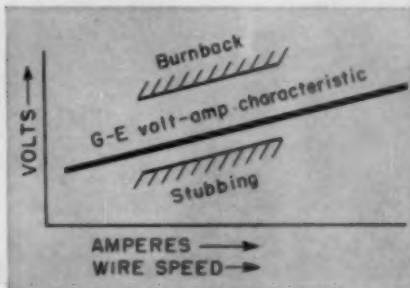
FOR MORE DATA contact your G-E welding sales engineer—and write for bulletin GEC-1334 to Section 713-1, General Electric Co., Schenectady, N. Y.

SEE G-E automatic Fillerarc equipment demonstrated at the National Metal Exposition, Philadelphia, October 17-21.

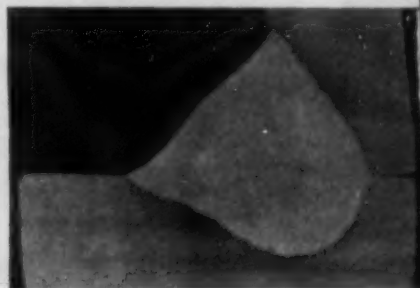
Why the complete G-E system makes possible quality mild-steel welds with CO₂



G-E SELF-REGULATING GENERATOR is the heart of the Fillerarc Automatic Welding system. Unique rising volt-amp curve maintains constant arc length.



RISING VOLT-AMP CURVE of the exclusive G-E Fillerarc generator matches rising arc curves... does not get into area of burnback and stubbing. Resulting high weld quality is uniform.



DEEP PENETRATION is produced by short arcs and faster wire speeds typical with Fillerarc equipment. Above: weld on semi-killed steel.

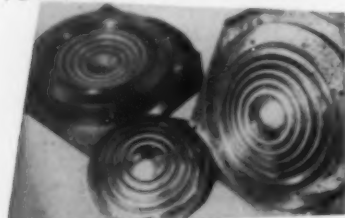
Progress Is Our Most Important Product

GENERAL  ELECTRIC

Now YOU CAN GET MORE TOOLING FOR YOUR DOLLAR



WHATEVER product you manufacture, Rezolin Toolplastik will aid you in reducing your production costs by providing you with a simple and effective method of tooling. Rezolin Toolplastik materials will reduce tool fabrication time and the cost of your present tooling material. Ideally suited for producing draw dies, drop hammer dies, stretch dies, chucks, assembly fixtures and jigs, models, etc.



INTERCHANGEABLE PLASTIC DRAW DIES
Produced and trimmed over 15,000 auto hub caps
saving 40% of former tool costs.
Courtesy of Shore Metal Products, Los Angeles

Rezolin Toolplastik material
offers more cubic inches of
precision tooling per dollar than
any other material in
the field.

When a tooling need arises
consider Toolplastik.

Write for your free informative
Brochure and Handy Use Guide.

**REZOLIN
TOOLPLASTIK**

5736 WEST 96TH STREET
LOS ANGELES 45, CALIFORNIA

DALLAS • DETROIT • NEW YORK

EPOXY RESINS • PHENOLICS • DYFORM
ACCESSORY PRODUCTS

CALENDAR

OF COMING SHOWS AND MEETINGS

- AIEE National Electronics Conference, Chicago, Ill. Oct. 2-7
- AIEE Fall General Meeting, Hotel Morrison, Chicago, Ill. Oct. 2-7
- World Plastics Fair and Trade Exposition, National Guard Armory, Los Angeles, Calif. Oct. 5-9
- Society of Industrial Designers, annual meeting and design conference, Woodner Hotel, Washington, D. C. Oct. 6-8
- Navy-Industry Conference on Packaging and Materials Handling, Washington, D. C. Oct. 10-12
- ASME-ASLE Joint Lubrication Conference, Antlers Hotel, Indianapolis, Ind. Oct. 10-12
- Air Transport Association, engineering and maintenance conference, Baker Hotel, Dallas, Tex. Oct. 11-12
- SAE Golden Anniversary Aeronautic Meeting, Production Forum, and Engineering Display, Hotel Statler, Los Angeles, Calif. Oct. 11-15
- National Metal Exposition, Convention Hall, Philadelphia, Pa. Oct. 17-21
- National Safety Congress and Exposition, Chicago, Ill. Oct. 17-21
- International Motor Show, Earle Court, London, England. Oct. 19-29
- AGMA Semi-annual Meeting, Edgewater Beach Hotel, Chicago, Ill. Oct. 23-26
- ASA Conference on Standards, Sheraton-Park Hotel, Washington, D. C. Oct. 24-26
- Canadian Industrial Tool and Equipment Show, Montreal, Canada Oct. 24-29
- ASME-IME Joint Conference on Combustion, London, England Oct. 25-27
- ASME Annual Technical Convention, Detroit, Mich. Oct. 26-28
- NICB Conference on Atomic Energy in Industry, Waldorf-Astoria Hotel, New York, N. Y. Oct. 26-28
- National Conference on Industrial Hydraulics, La Salle Hotel, Chicago, Ill. Oct. 27-28
- Automobile Old Timers, 16th anniversary dinner Waldorf-Astoria Hotel, New York, N. Y. Oct. 29
- ANA Annual Meeting, Hotel Plaza, New York, N. Y. Oct. 31-Nov. 2
- SAE Golden Anniversary National Transportation Meeting, Hotel Chase, St. Louis, Mo. Oct. 31-Nov. 2
- National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago, Ill. Oct. 31-Nov. 2
- Fifth Transport Aircraft Hydraulic Conference, Park Shelton Hotel, Detroit, Mich. Nov. 2-3
- National Fluid Power Association, Fall meeting, Edgewater Beach Hotel, Chicago, Ill. Nov. 2-4
- SAE Golden Anniversary National Diesel Engine Meeting, Hotel Chase, St. Louis, Mo. Nov. 2-4
- National Tool and Die Manufacturers Association Convention, Statler Hotel, Detroit, Mich. Nov. 3-6
- SAE Golden Anniversary Fuels and Lubricants Meeting, Bellevue-Stratford Hotel, Philadelphia, Pa. Nov. 9-10
- ASME Diamond Jubilee Annual Meeting, Congress, Conrad Hilton, and Sheraton-Blackstone Hotels, Chicago, Ill. Nov. 13-18
- Second International Automation Exposition, Navy Pier, Chicago, Ill. Nov. 14-17



**DON'T GIVE ME
THAT!**

YOU CAN'T BEAT GARRETT SERVICE

I'm not a wise guy, but I do know about the service these Garrett plants give you. Seems hard to believe. Those fellows bend over backwards to help you out in an emergency. And their regular service means you always get deliveries when promised . . . sometimes before.

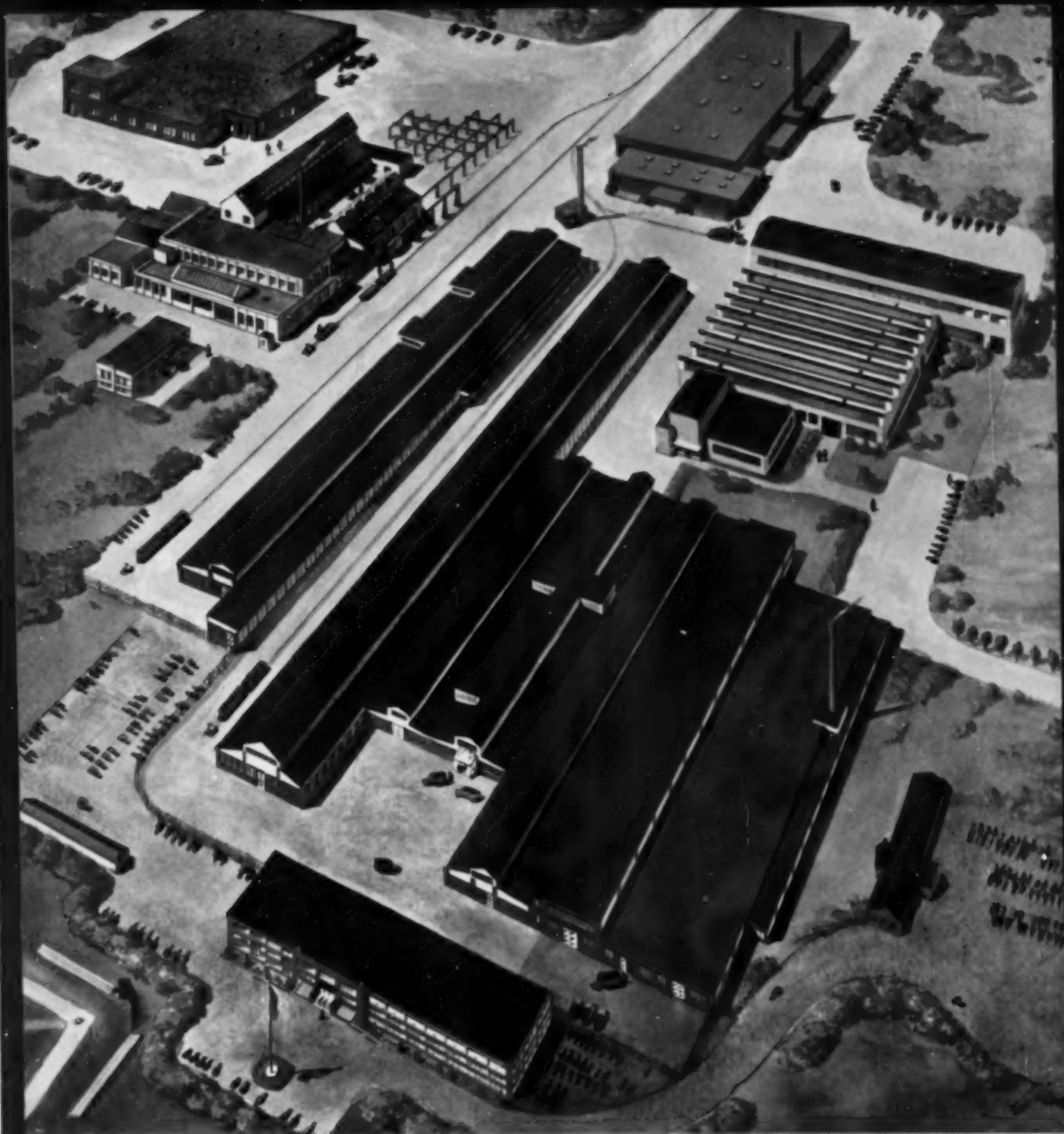
Of course, when it comes to quality they are tops on lock washers, flat washers, spring washers, hose clamps, stampings and assemblies. They have three plants equipped with the most modern high-speed automatic machinery to turn out billions of parts to exact specification . . . complete heat treating, plating and finishing facilities. If you don't believe me, next time send your order into Garrett. You'll see why their customers say YOU CAN'T BEAT GARRETT.

**LOCK WASHERS
FLAT WASHERS
HOSE CLAMPS
STAMPINGS**

Manufactured by

GEORGE K. GARRETT CO., Inc.
Philadelphia 34, Pa.





This is The New Britain Machine Company...

A composite view of The New Britain Machine Company's six plants in New Britain, Connecticut; Springfield, Massachusetts; Cleveland, Ohio; and Dayton, Ohio... built on a foundation of sixty years of service to the world's metalworking industries. Its machine tool divisions produce: ■

- Automatic Bar Machines
- Automatic Chucking Machines
- Precision Boring Machines
- New Britain +GF+ Copying Lathes
- Lucas Precision Horizontal Boring, Drilling and Milling Machines
- Special Automatic Metalworking Machines

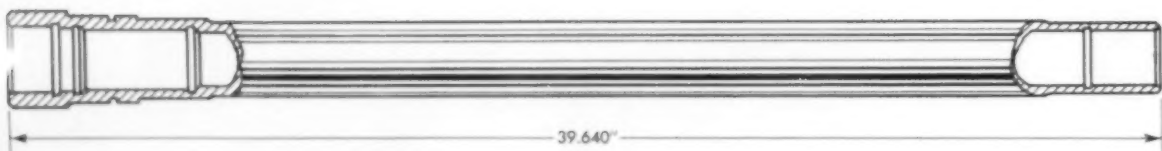
For news of New Britain developments that could improve your production methods, see the four following pages.

See it in operation

Ask your New Britain representative for a showing of the color motion picture "A NEW APPROACH TO COPY TURNING." Or write The New Britain Machine Company, New Britain, Connecticut.

This is New Britain's approach to copy turning

Can you find profit opportunities in *your* shop with this new approach? Let your New Britain man help you . . . that's his business.



Saves \$10 per piece and \$3,000 worth of gauges plus labor and overhead on two machines

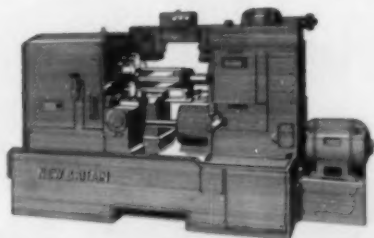
These are the five operations which formerly required four separate set-ups on three different machines: (1) Rough turn three Outside Diameters, (2) rough turn four Outside Diameters, (3) face large end, center, bore three Inside Diameters, undercut and chamfer

three surfaces, (4) face end to length, bore center and undercut, (5) finish turn six Outside Diameters, undercut, form radii and chamfer — all this machining is done in five operations on one New Britain **+6F+** Copying Lathe.



New Britains are "naturals" for work like this

New Britain alone makes *both* tool rotating



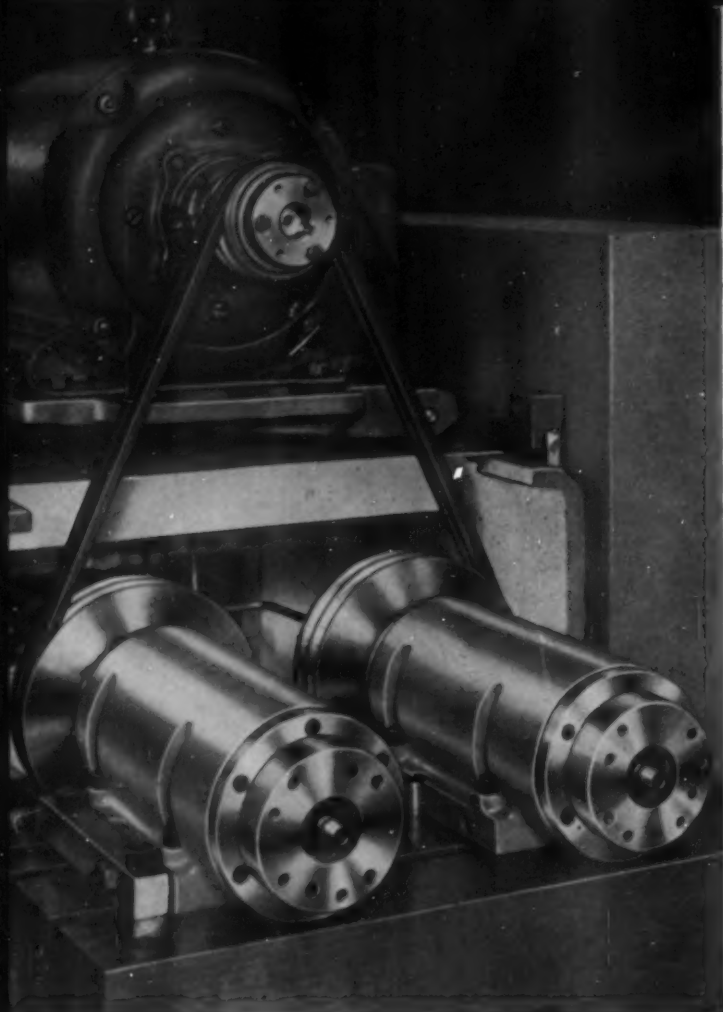
and



work rotating chucking machines, to

provide the best approach to economical production of your work.

The two preceding pages and two following present other New Britain New's.



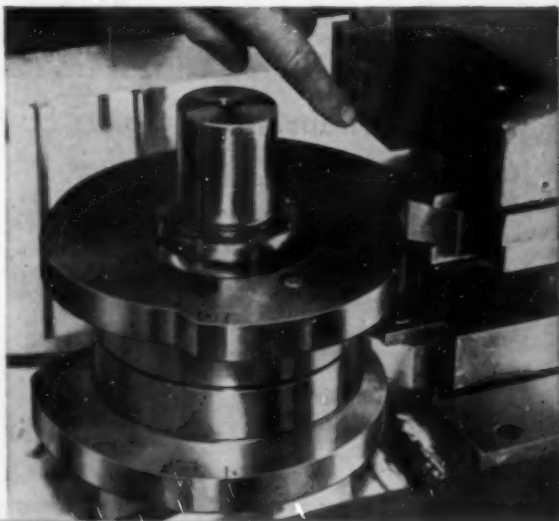
Spindle accuracy is the first essential to holding close tolerances on a boring machine. To utilize this accuracy New Britain spindles are mounted on a stationary bridge securely bolted to the rigid frame of the machine. Drive motor is mounted on a separate bridge above the spindles . . . table is not affected by motor heat and vibration.



Secret of permanent boring machine accuracy: Pinpoint control protected by the mass of the machine

A true running cam shaft preserves the accuracy of the tool path. Easily accessible precision cams are mounted on a shaft, straddle mounted directly to the frame of the machine (top bearing bracket has been removed in this photo). Top and bottom cam shaft bearings are a minimum distance from the cam. The shaft keeps its accuracy because of this rigid mounting, and also because the thrust from both cam followers is in one direction.

New Britain Precision Boring Machines have provided a new approach to the fast production of problem pieces in America's leading high output plants. Ask your New Britain man or write The New Britain Machine Co., New Britain, Conn., for the book, "24 COST CUTTING JOBS."



This is an easy job for a Lucas



This twenty-foot weldment requires a combination of milling, boring and key slotting, all of which are performed in one setting. Backrest was removed from the machine, and the work is supported on an auxiliary table. (Photo courtesy Steel Equipment Co., Cleveland, O.)



This awkward work piece is another demonstration of Lucas flexibility. A LUCAS PRECISION HORIZONTAL BORING, DRILLING AND MILLING MACHINE does a wide range of work easily, accurately and inexpensively. You have ruggedness, accuracy and flexibility of work handling that you can count on.

Automatic power positioning enables you to positively repeat operations on any number of pieces. New ultra-simple pendant control is always at the operator's fingertips. Let your Lucas representative show you how far your machine-tool dollar can go, invested in this most versatile machine in any shop.

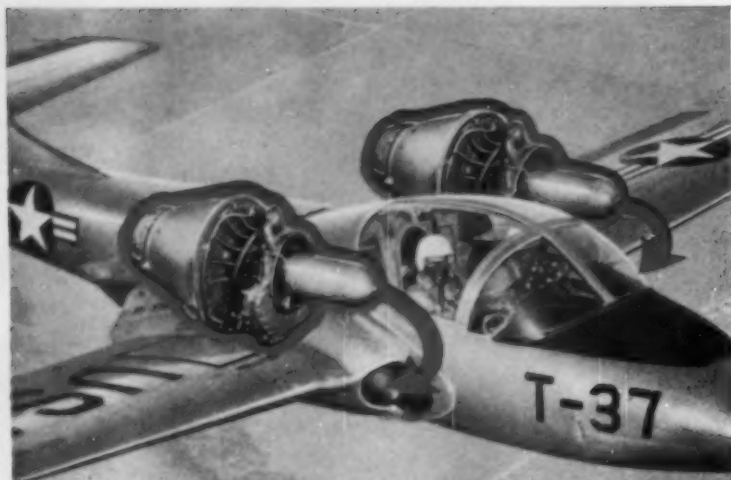
LUCAS MACHINE DIVISION
The New Britain Machine Company • Cleveland 8, Ohio

The NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut
Lucas Machine Division, Cleveland 8, Ohio

• AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES
• LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES • NEW BRITAIN • 8F • COPYING LATHE'S

See the preceding four pages for other New Britain New's.



For High Performance, plus SAFETY ... the Cessna T-37

**SIDE-BY-SIDE JET TRAINER with
SIDE-BY-SIDE C.A.E. POWER**

It's engineered with tomorrow's needs in mind, this high-performance twin-jet Cessna T-37—designed to speed the cadet's transition from prop-driven airplanes to jets. It advances the jet phase to an earlier stage of the training schedule, promoting both safety and economy. Its Continental Model J69-T-9 jet turbines offer ruggedness and simplicity matching that of the airplane itself. Twin engines located in the wing roots make for maximum safety. A second version of this turbine powers the Ryan Q2 Firebee target drone used in aerial gunnery training, while still others are in experimental stages in various applications.

The C.A.E. family of gas turbines also includes the Model 220 fixed shaft turbine which powers the record-holding Sikorsky XH-39 helicopter; the Model 210 used in the L-19-C turboprop liaison plane, and the Model 140 air compressor. The latter is the heart of the MA-1 portable starter for large jets, which is built in its entirety by C.A.E., under Air Force contract.



**OPPORTUNITIES UNLIMITED—
INVESTIGATE YOUR AIR FORCE
RESERVE TODAY**

CONTINENTAL AVIATION & ENGINEERING CORPORATION
12700 KERCHEVAL AVENUE, DETROIT 15, MICHIGAN
SUBSIDIARY OF CONTINENTAL MOTORS CORPORATION

SAE Tractor Meeting

(Continued from page 53)

easy maintenance rather than trying to make modifications and warned that ease of maintenance requirements ultimately will be written into purchase specifications.

Valve rotation, and use of white gasoline with alcohol-water injection, prolong farm tractor valve life, according to J. A. Weber, of the University of Illinois. Mr. Weber reported the results of two full years of testing farm-operated tractors as indicating that the differences between white and regular gasoline were the only factors of fuel type or quality tested that had a significant effect on tractor valve life. Tractors burning regular gasoline had excellent valve life with positive rotation, he said, operating for as long as five years without valve failure. He added that no valve failures occurred in tractors using white gasoline with alcohol-water injection, but that problems of dust protection and storage arise.

Progress in the development of safety clutches for tractor power take-off drives was described by Sherman C. Heth, of J. I. Case Co., Racine, Wis. He said a device invented by L. R. Clausen apparently is the closest approach to the type desired. It was said to depend for action on a torque spring which causes the axially movable clutch component to advance into clutch face contact by rotation in respect to a fine pitch cam surface.

Development of a Diesel-powered farm tractor which consumes minimum fuel and can be started and operated in temperatures to -20 F was reported by B. G. Valentine and Russell Candee, of John Deere Waterloo Tractor Works, Deere Manufacturing Co. They said the engine produces 50 hp, operates at 1125 rpm and consumes 15 per cent less fuel than comparable tractors.

OBSERVATIONS

(Continued from page 94)

received a copy of the July issue of the SRI News Bulletin. We recommend a reading of the section dealing with the widening front of nuclear engineering since it deals with many applications that are not commonly known except in scientific circles.

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**



Foremost in **ECONOMY**

STROMBERG

AMERICA'S FINEST

CARBURETOR

Economy is a magic word in the automobile business. Economy of operation is a mighty sales clincher in any dealer's showroom. Economy in manufacture is vital to protect the narrow profit margin of the auto maker. The Stromberg Carburetor offers you both.

Stromberg's system of consistent fuel metering results in economy of operation unmatched by any other carburetor. Automotive experts know it. Fuel consumption statistics prove it. And two consecutive victories for Stromberg-equipped cars in the famed Mobilgas Economy Run confirm it.

But Stromberg can mean even more as an economy factor for the manufacturer. Because of the vast number of different carburetor models which Stromberg makes available to manufacturers, a Stromberg Carburetor can usually be selected to fit the needs of any engine with a minimum of costly revisions.

For more than forty years, Stromberg has been the American



For two consecutive years, the grueling Mobilgas Economy Run has been won by a STROMBERG-equipped Studebaker.

leader in every phase of carburetion. More advances in this field have been initiated by Stromberg than by any other manufacturer.

The folks who make Stromberg Carburetors enjoy tackling a difficult problem—because when you have a problem we can solve, everyone is happy. You have a better product, we have a satisfied customer, and the motorist has a more efficient automobile.

Call on us. The Stromberg application engineer is at your service. You'll find he knows his business—and he may help build yours.

ECLIPSE MACHINE DIVISION OF BENDIX AVIATION CORPORATION

Original Equipment Sales: Elmira, N. Y. • Service Sales: South Bend, Ind.
Export Sales and Service: Bendix International Division, 205 E. 42nd Street, N. Y. 17, N. Y.

Stromberg® Carburetor

Bendix® Electric Fuel Pump

Bendix® Full-Thru Starter Drive

REG. U. S. PAT. OFF.



The STROMBERG application engineer will be happy to discuss carburetion problems with you at your convenience.



METALS

(Continued from page 96)

by management and stock control with the big producers are hard put. A prominent copper and brass fabricator admitted its operations were no more than 60/65 per cent of capacity in mid-September.

Appeal for Stockpile Copper

Indicative of the acute shortage is the appeal of the Copper & Brass Research Association, representing leading mills, to President Eisenhower, declaring that the copper and brass industry was suffering the worst crisis in the industry's history. A release of 100,000 tons of copper from the national stockpile was petitioned. This copper was bought from Chile to aid that country's economy last year. With some justice, they contend that the present need is just as great to aid our own economy.

It does not appear that there is much hope for favorable consideration, however sympathetically it might be viewed. The law declares that stockpiled metal can only be released for national defense in emergency.

Flood Damage to Brass Fabricators

The brass industry received a body blow from the floods that devastated the Connecticut Valley in August, causing the severest damage to many major plants and cutting production drastically. However, some of the earlier estimates now fortunately appear too pessimistic. It now, appears that nearly full operation may be resumed by November and partial operation in October. In some instances, notably the American Brass Company, production has been shifted to western plants on a 24-hour, 7 day week basis.

Scrap metal dealers are not hastening to sell their supplies to custom smelters believing the price will go even higher. Copper refiners have offered 42½ cents, equal approximately to 46-47 cents a pound for copper that won't be available in refined form for 60-90 days without attracting much interest.

Zinc Price Higher

The higher zinc price which was raised ½ cent a pound early in September to 13 cents, loftiest level since January, 1953, was well justified by

the August statistics of the Zinc Institute which followed immediately after the announcement. Shipments in August totaled 90,000 tons, up sharply from July. Quite significant were the higher shipments to domestic consumers which came to 87,042 tons, while tonnage to the strategic stockpile declined to 2153 tons, reflecting unwillingness of the producers to accept the government's bid. Contrary to expectations, stocks of slab zinc on hand at the month's end fell 5200 tons to 46,087 tons, the lowest figure reported for several years. Unfilled orders showed a good increase to 73,062 tons.

Overall demand for zinc has consistently been reported amazingly good. The flood disaster in the Connecticut Valley knocked out operations of many brass fabricators in that area, but apparently did not affect demand for zinc from them as work was transferred to plants elsewhere. Special high grade zinc used by die casters is in so short supply it is being allocated.

It's not expected that zinc demand will suffer because of the higher price. American Zinc Co., which initiated the increase, blamed it on increased wage and supply costs. This may very well be, but the inflationary atmosphere that promoted the violent increases in the copper price undoubtedly stimulated zinc as well. It is pretty certain that the increase would have occurred earlier if the London price had not remained static.

Lead consumption has been good and supplies are low. The strike at American Smelting plants caused the loss of 30,000 tons of refined lead, but did not affect mine production, hence stockpiled ore and concentrates were adequate when work was resumed. Imports and a steady flow of scrap have helped keep the situation within bounds. Shipments of replacement batteries have risen seasonally, but are still lower than corresponding periods in 1954.

Government to Defer Aluminum Purchases

The Government won't buy aluminum for the stockpile in the fourth quarter because of the current shortage. Aluminum smelters are also asking that exports of aluminum scrap be restricted to 1500 tons and that any additional tonnage needed for export should come from primary aluminum supplies. Their point is that aluminum scrap is selling so high that the price of their secondary aluminum is higher than primary.

As a result of sky-high copper prices, consumers are turning to alu-

(Advertisement)

Engineers! Join this winning team!

At DOUGLAS you'll be associated with top engineers who have designed the key airplanes and missiles on the American scene today. For example:



DC-7 "SEVEN SEAS" America's finest, fastest airliner



F4D "SKYRAY" Only carrier plane to hold world's speed record



C-124 "GLOBEMASTER" World's largest production transport



NIKE Supersonic missile selected to protect our cities



"SKYROCKET" First airplane to fly twice the speed of sound



A3D "SKYWARRIOR" Largest carrier-based bomber



A4D "SKYHAWK" Smallest, lightest atom bomb carrier



B-66 Speedy, versatile jet bomber

With its airplanes bracketing the field from the largest personnel and cargo transports to the smallest combat types, and a broad variety of missiles, Douglas offers the engineer and scientist unequalled job security, and the greatest opportunity for advancement.

For further information relative to employment opportunities at the Santa Monica, El Segundo and Long Beach, California, divisions and the Tulsa, Oklahoma, division, write today to:

DOUGLAS AIRCRAFT COMPANY, Inc.

C. C. LaVene, Employment Mgr.
Engineering General Office
3000 Ocean Park Blvd.
Santa Monica, California

TACTICAL PROBLEM: *To design and build a jet bomber able to operate from the smallest World War II "jeep" carriers.*

PRACTICAL REPLY:



The DOUGLAS A4D Skyhawk

Designed for the U. S. Navy and now in volume production, the Douglas A4D Skyhawk cuts many of the tactical restrictions imposed by the higher landing and take-off speeds of modern jet aircraft.

This compact attack bomber flies faster and farther with a greater striking load

than any airplane of comparable size . . . outspeeds many jet fighters twice its size. Yet it can fly with ease from "jeep" carriers and short, advanced airstrips barred to most jets. Wingspan is so short that Skyhawk can be stored in quantity aboard carriers *without folding*

its wings—a simplification that makes important savings in both weight and fuel.

Performance of A4D Skyhawk is another example of Douglas leadership in aviation. Greater utility with lower production cost, through highly simplified design, is always a rule at Douglas.



*Be a Naval Flier—write to
Nav Cad, Washington 25, D. C.*

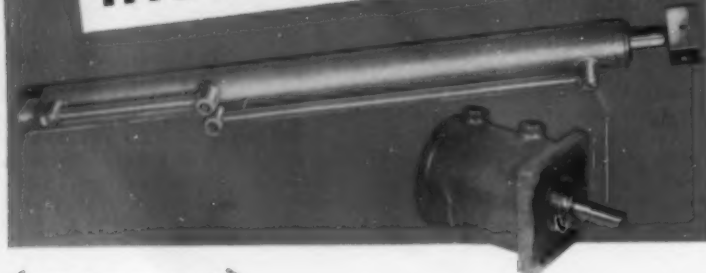
Depend on **DOUGLAS**



First in Aviation

HYDRECO Oil Power

OFFERS ENGINEERS- CUSTOM DESIGN in HYDRAULIC CYLINDERS!



Even simple functions may entail special configurations to give maximum results...



Or, when the function involves motion in more than one direction, custom design develops mountings to suit the application...



Or cylinder movement in any direction, and many other variables are yours with HYDRECO Custom Design.

For the engineer whose target is equipment that will outperform any comparable unit—the special facilities offered by HYDRECO can materially assist in attaining the objective. Not with so-called "standard" cylinders but rather with cylinders custom engineered and built to do the specific job.

Requirements of space, mounting, or hydraulic connections that could never be met by "standard" cylinders, can be fulfilled easily through custom designing.

And too, HYDRECO's variety of experience in designing and building special hydraulic components in volume production can keep the product costs within the budget.

That which is true of HYDRECO Cylinders is equally true of HYDRECO Pumps, Motors and Valves. To improve the performance of existing equipment or to add functions and complete dependability to projected designs—look to HYDRECO Oil Power!

WRITE— for full information today on HYDRECO Pumps, Motors, Valves and Custom Built Cylinders.

HYDRECO DIVISION
THE NEW YORK AIR BRAKE COMPANY

1105 EAST 222nd STREET • CLEVELAND 17 • OHIO
INTERNATIONAL SALES OFFICE, 90 WEST ST., NEW YORK 6, N. Y.



minum as a substitute in increasing numbers. Percentagewise, copper is selling about 350 per cent of the post-war price while aluminum is up only 40 per cent. Aluminum manufacturers report inquiries for fuel lines and radiators for automobiles and for home wiring and appliances now made of brass.

For the first seven months of the year, total production of primary aluminum was 892,300 tons, up from 841,500 tons in 1954. Shipments of aluminum die castings were 52,800 tons, up sharply from 36,300 tons in the same period last year.

Lead Firm But Price Rise Not Expected

Zinc and lead prices usually move in unison but there is little belief that the present lead price of 15 cents a pound will be disturbed at present. This is hitched to the thought that Washington will not continue stockpile purchases at a higher level than 28 cents for combined lead and zinc, which price has already been reached with zinc at 13 cents.

Spray Coating

(Continued from page 102)

After the valves are immersed in the salt solution, they are vibrated by a special machine built by Thompson. This machine, operating at 60 cycles, vibrates the valves at an amplitude of 0.010-0.015 inches.

The valves are kept in the 1350 F molten salt for approximately one minute. The furnace, rated at 227 kw, has a work capacity of seven carriers or 210 valves.

Valves leaving the salt bath are given a water wash, an acid rinse, and finally a hot water rinse. The valves run through the washing units, which have a hot water and steam spray system, in about 13-14 minutes.

BOOKS...

ELECTRO-MAGNETIC MACHINES, by R. Langlois-Berthelot, published by Philosophical Library, 15 E. 40th St., New York 18, N. Y. Price, \$15.00. First published in France, this book is a standard work on the subject of electro-magnetic machines. It relates the various kinds of electrical machines to each other, recognizing them as being of one family having a common basis of existence. Fundamental principles that remain, rather than practice that frequently changes, are in the text of this book firmly established.



On the assembly line of a leading automotive manufacturer, workers are installing Johnson bearings in a popular six-cylinder engine.

Leading Automotive Manufacturer Depends On Johnson As A Supplier Of Bearings

Here's Why: First, Johnson engineers, metallurgists, and production men devote all the time necessary to help solve problems in the design and production of engine bearings to meet demands for higher speeds and longer service.

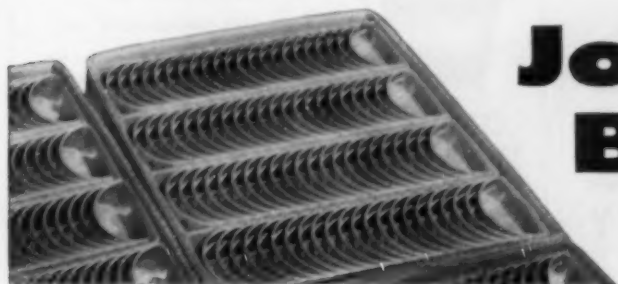
Second, Johnson, as a leading supplier of original equipment bearings to automotive manufacturers, can be depended upon to meet exacting specifications bearing after bearing, order after order when it comes to tolerances, smooth, mirror-like finish, and chemical analysis of the

various metals specified.

Third, Johnson has built a reputation for getting bearings delivered when and where they are wanted and in the type of packages ordered.

Fourth, Johnson's prices are competitive with other leading bearing manufacturers.

If you have a problem in the design of engine bearings, a Johnson man might have your answer. It won't cost anything to talk it over. Write, wire, or phone the Johnson Bronze Co., 625 S. Mill St., New Castle, Pa.



Johnson Bearings

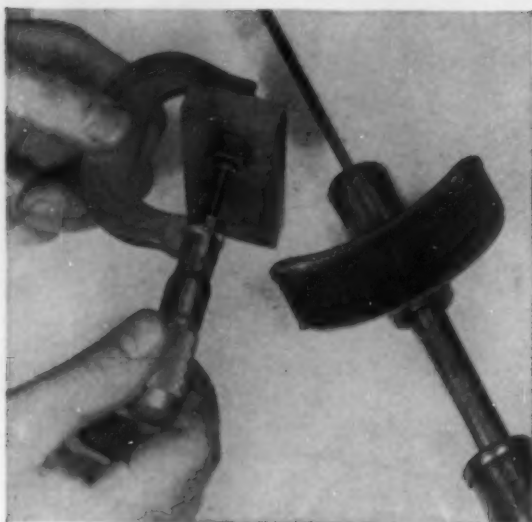


Figure 4

24 page
engineering
data...
Section

Figure 4 illustrates the mechanics involved in one method of determining experimentally the optimum tightening torque to be specified for a particular application of highly stressed bolts and nuts . . . Whenever possible this work should be done with production parts on the actual assembly, under actual assembly conditions, such as lubrication, temperature, etc., or with a test block . . . When such tests are impossible because bolt ends are inaccessible or for any other reason, a Torque Guide is helpful . . . All factors involved in the procedure to be followed and a Guide Chart, are included on pages 6, 7, 8 and 9 in the twenty-four page Engineering Data Section of our catalog . . . Requests for this literature will be handled promptly.

**NATIONAL
 MACHINE
 PRODUCTS
 COMPANY**

*Manufacturer of Standard
 and Special #12 Pointer and
 Hexagon Nuts . . . "Huglock"
 and "Maraden" locknuts.*

44233 Ulster Rd., UTICA, Michigan

Multiform
STEEL RULE

Die's
 SINCE 1900

LET US SOLVE YOUR
 DIE-CUTTING PROBLEMS
 WITH RICHARDS' "TOUGH TEMPER"
 STEEL RULE CUTTING DIES
 HEADQUARTERS SINCE 1900
 FOR DIES AND DIE MAKING
 EQUIPMENT AND SUPPLIES

(Punches, Die Boards, Cutting Rule, Eject. Rubber)

FOR AUTOMOTIVE, AIRPLANE, RUBBER,
 FELT, INSULATION, SEATING, CORK,
 GASKET, TAR BOARD, PLASTICS, ETC.

J. A. RICHARDS CO. 903 N. PITCHER
 KALAMAZOO, MICH.

**LOOKING
 FOR**

**PREMIUMS
 GIFTS
 PRIZES**



Just off the press—the biggest catalog of its kind! Over 900 pages jam-packed with thousands on thousands of widely diversified and nationally known items to help fill your gift requirements. Jewelry, sporting goods, toys, appliances, cameras and general merchandise—quality products in virtually every price category. Six floors of top-line merchandise in our own newly modernized building.



**Free! 900 PAGE
 CATALOG**

PLUS GIFT SUGGESTION LIST

Send today on your business letterhead for free giant catalog and our Prize Suggestion Folder — a really helpful guide to your "giving" problems.

Member of the following organizations: National Association of Manufacturers — Chicago Association of Commerce — Chicago Association of Credit Men — Illinois Manufacturers Association — Jewelers' Board of Trade — Dun and Bradstreet — Illinois State Chamber of Commerce.

**JOSEPH HAGN
 COMPANY**
 325 West Madison
 Chicago 6

The standard
for
the leaders
in new
engine design

Detroit
Aluminum
and
Brass

ENGINE BEARINGS

Tell our engineers about your requirements

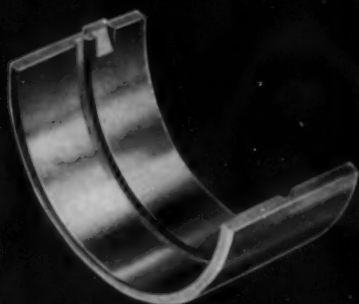
**Detroit Aluminum and
Brass Corporation**

DETROIT 11, MICHIGAN

Plants at Detroit, Michigan and Bellefontaine, Ohio

You can rely on the same research that conceived, designed and developed the now famous and much imitated "Thin-Wall Babbitt bearing.

*U.S. PAT. NO. 2173985



We can meet high production needs or special requirements for bearings and bushings of every type used in original equipment.

Steel backed, copper lead and aluminum alloy-lined bearings are lead-tin overplated to customer's specifications.

760 West Park Street Chicago 7, Illinois

See our full page 'ad' in the "STATISTICAL ISSUE" p. 363

The Fellows Gear Shaper Company, Springfield, Vermont, U.S.A.



AUTOMOTIVE INDUSTRIES, October 1, 1955

FINEST to the **COARSEST**
IN PERFORATED METALS



and **FERGUSON**
specializes in perfection

When you need perforated metals, Ferguson is the place to send your requirements. Write to us about your specifications. We specialize in small perforations.

FERGUSON PERFORATING & WIRE CO.
130-140 ERNEST STREET, PROVIDENCE 5, RHODE ISLAND
SEND FOR CATALOGUE

STAMPINGS

Produced economically in our modern plant for:

AUTOMOTIVE, INDUSTRIAL EQUIPMENT, AIRCRAFT, AGRICULTURAL INDUSTRIES AND OTHERS; will boost your output at material savings.

Our production, engineering and tool-room facilities are geared to the volume usage of your industry.

Send us your inquiries

LANSING STAMPING COMPANY

1157 So. Penn. Ave.
Lansing 2, Michigan

Serving Industry Since 1914

THEY'LL PAY FOR THEMSELVES THE FIRST TIME YOU USE THEM



A new Vellumoid product that makes replacing oil pans and gaskets a **SNAP** instead of a headache!

VELLUBOLTS

PATENT PENDING

- Screw the VELLUBOLTS into the four corners of the engine bed. Snap the gasket over the bolts, then snap the pan on over the gasket and presto! . . . the pan is locked in place while you screw in the regular bolts. Then remove the VELLUBOLTS. They can be used over and over again.
- Set of 12—fitting most cars and small trucks—\$4.95. Set of 8—fitting large trucks and busses—\$3.75. Ask your jobber.

THE VELLUMOID COMPANY
WORCESTER 6, MASS.

VELLUBOLTS — THEY WORK LIKE MAGIC!

Index to Advertisers

This Advertisers' Index is published as a convenience, and not as part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert

A	
Acadia Div. Western Felt Works	138
American Broach & Machine Co.	110
American Chemical Paint Co.	46
American Society for Metals	28
Automotive Gear Works, Inc.	43

B	
Babcock & Wilcox Co.	45
Baird Machine Co.	76
Barnes Co., W. F. & John	6-7
Bausch Mach. Tool Co.	26
Bendix Aviation Corporation	
Eclipse Machine Div.	131
Products Div.	30
Bethlehem Steel Co.	115
Brown Corp., The	120
Buhr Machine Tool Co.	103
Bullard Company, The	5

C	
Carboley Dept., General Electric Co.	111
Chrysler Corp., Ampflex Div.	106
Cincinnati Milling Machine Co.	32
Clark Bros. Co.	10-11
Classified Ad	138
Cleveland Worm & Gear Co.	4
Climax-Molybdenum	47
Continental Aviation & Engineering Corp.	130
Copperweld Steel Co.	
Steel Div.	91
Cotta Transmission Co.	1
Cross Co.	12

D	
Danly Machine Specialties, Inc.	9
Detroit Aluminum & Brass Corp.	137
Dewey & Almy Chemical Co.	42
Douglas Aircraft Co., Inc.	132-133
DuPont De Nemours Co., Inc.	75-113

E	
Eaton Manufacturing Co.	
Saginaw Div.	24
Valve Div.	77
Enjay Co., Inc.	101
Ex-Cell-O Corp.	21

F	
Fellows Gear Shaper Co., The	138
Ferguson Perforating & Wire Co.	139
Ferry Cap & Set Screw Co.	22

G	
Garrett Co., Inc., George K.	124
General Electric Co.	122-123

G	
Gisholt Machine Co.	95
Gits Bros Mfg. Co.	142
Goodrich Chemical Co., B. F.	23
Goodyear Tire & Rubber Co.	15

H	
Hahn Co., Joseph	136
Hartford Special Machinery Co. (Machine Tool Div.)	109
Hassall, Inc., John	118
Hill Acme Co.	44
Hydrex Div., New York Air Brake Co.	134

I	
International Nickel Co., Inc.	2

J	
Johnson Bronze Co.	135

K	
Kasle Steel Corp.	138

L	
Lansing Stamping Co.	139
Laese-Neville Co.	116-17
Lucas Machine Division (New Britain Machine Co., The)	125 thru 129

M	
Mallory & Co., Inc., P. R.	18
Mechanics Universal Joint Div.	20
Michigan Drill Head Co.	106
Minneapolis-Honeywell Regulator Co.	19

N	
National Acme Co., The	121
National Machine Products Co.	136
National Standard Co.	141
New Britain Machine Co., The	125 thru 129
New York Air Brake Co. (Hydrex Div.)	134
Norton Company	74

O	
Ohio Seamless Tube Div. of Copperweld Steel Co.	78

P	
Perfect Circle Corp.	99
Pasco Products Div.	17

R	
Resolin, Inc.	124
Richards Co., J. A.	136

S	
Schwitzer-Cummins Co.	73
Shuler Axle Co., Inc.	Back Cover
Simmons Fastener Corp.	8
Simonds Abrasive Co.	29
Standard Oil Co. (Ind.)	2nd Cover
Standard Pressed Steel Co.	27
Staples Tool Co.	114
Star-Kimble Motor Div.	14
Sterling Aluminum Products, Inc.	97
Subscription Post-Card	88
Sun Oil Company	107-108
Synchro-Start Products, Inc.	138

T	
Texas Company, The	40
Tutill Spring Co.	138

U	
United States Treasury Dept.	119
Upholstery Leather Group Inc.	112

V	
Vellumoid Co.	139

W	
Waldes Kohinoor, Inc.	13
Western Felt Works	138
Wyman-Gordon	16

Y	
Young Radiator Co.	25

Z	
Zallner Machine Works	3rd Cover



How a
special wire cloth
"wraps up"
better crops

● Fanning mill cloth—used in huge machines for grading seeds—must be virtually perfect dimensionally. Even slight deviations in the mesh openings affect the value of seed crops . . . for grading must be *precise* under rigid government inspection.

Like other producers, the Reynolds Wire Division of National-Standard had been supplying cloth of bright galvanized wire. Could it be improved upon? After prolonged research with various finishes and types of wire, Reynolds hit on the idea of developing cloth of National-Standard's Copperply® wire for this special use.

Copperply fanning mill cloth, now available, offers re-

markable new advantages. Its soft, electroplated copper coating "sets" better, permitting extreme accuracy in weaving and greater stability in use. Slick and bright, it speeds the *flow* of seeds in screening. Finally, its conductivity permits effective grounding to avoid seed accumulation due to static electricity.

Here's only one of many, many examples of how Reynolds undertakes new developments to help customers solve problems and produce *better* products, often at *lower* cost. But problem or no problem, Reynolds customers, and National-Standard customers in general, know the satisfaction, the value, of exceptional service and cooperation. Try us; you'll see.



NATIONAL-STANDARD COMPANY • NILES, MICHIGAN

Tire Wire, Stainless, Fabricated Braids and Tape

ATHENIA STEEL DIVISION • CLIFTON, N. J.

Flat, High Carbon, Cold Rolled Spring Steel

REYNOLDS WIRE DIVISION • DIXON, ILLINOIS

Industrial Wire Cloth

WAGNER LITHO MACHINERY DIVISION • JERSEY CITY, N. J.

Special Machinery for Metal Decorating

WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.

Round and Shaped Steel Wire, Small Sizes

Here's How

GITS

Helps Give

Built-In Low Cost To YOUR Equipment



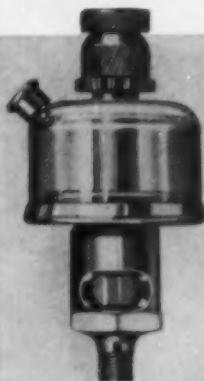
OIL HOLE
COVERS

This model is designed to fit into a simple drilled hole. Ideal for use on small motors, generators, starters and light machinery—for dependable oil hole protection at moderate cost. Larger sizes frequently used as filler caps on tanks or reservoirs. Style R—No. 305.



OIL
CUPS

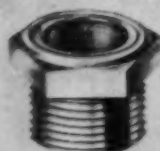
Accurately machined from a solid brass one-piece forging, this oil cup permits safe, dependable application of lubricant at very low cost. Used widely on motors and small machinery requiring side oiling. Style L—No. 1202.



SIGHT
GRAVITY .
FEED
OILERS

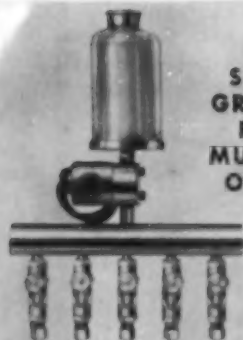
Rate of oil flow regulated by needle valve, directly observed through sight glass in stem.

Shut-off knob does not affect needle valve adjustment. Visible oil supply. Non-breakable. Tops in convenience and dependability, at low cost. Style NFU—No. 3602-A.



GEAR
CASE
GAUGES

This oil gauge plug permits instant checking of oil level within a transmission or gear case. For use where construction permits insertion in tapped hole. A valuable addition to any such equipment—at very low cost. Style BW—No. 4042.



SIGHT
GRAVITY
FEED
MULTIPLE
OILERS

This one unit replaces 3 to 8 individual oilers. Maximum practicality in a small central lubrication system. Positive cut-off during idle periods. Individual vibration-proof needle valve adjustments. With solenoid control (Illustrated): Style MDS—No. 4685-A. Without solenoid: Style MD.

SIGHT GAUGES

For use where rate of oil flow must be regulated to suit changing operating conditions.

Needle valve permits extremely accurate adjustment of oil feed.

Sight glass provides direct observation of rate of oil flow. Accuracy and convenience at a moderate price. Style PF—No. 4290.



Don't price yourself out of the market. When you design proper lubrication into your equipment, specify GITS Lubricating Devices—the widest selection available anywhere. The items pictured above are only a few of our many thousands of lubricating devices. At the design stage, get the GITS story. Free Engineering Service. Send NOW for your free Catalog.

GITS BROS. MFG. CO.

The Standard For Industry For Almost Half A Century

1878 South Kilbourn Avenue
Chicago 23, Illinois

Clip this page for handy "rough reference"

Sensational Piston Performance

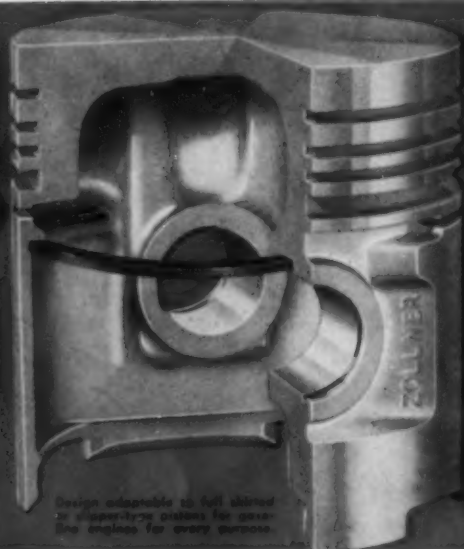
UNIFORM CLEARANCE AT ALL TEMPERATURES

STEEL TENSION MEMBER

Anchored only at pin bosses
and cast in positive contact
with I. D. of piston skirt

Controls Clearance Automatically

ZOLLNER
CLEAR-O-MATIC
PISTONS



Design adaptable to full skirted
or finger-type pistons for gas-
line engines for every purpose.

Now, pistons may be fitted to closer clearances than ever before possible. The sensational development of CLEAR-O-MATIC Pistons by Zollner engineers reduces required clearance to less than .001 with constant uniformity of skirt bearing over the entire temperature range. Performance results are spectacular. Engines run quietly with no cold slap. Friction is reduced without loss of durability or heat conductivity. There is no danger of scuffing or seizing. The Zollner designed steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. We urge your immediate test of these sensational advantages for your engine.



UNIFORM
EFFECTIVE SKIRT
CLEARANCE
AT ALL
TEMPERATURES

- 1 Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
- 2 Effective expansion identical with ferrous cylinder.
- 3 Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
- 4 Normal diametric clearance usually less than .001 with uniform skirt bearing.
- 5 Durability and conductivity comparable to heavy duty design.

ZOLLNER

THE ORIGINAL EQUIPMENT PISTONS

PISTONS

ZOLLNER

ZOLLNER MACHINE WORKS • Fort Wayne, Indiana

ADVANCED
ENGINEERING
PRECISION
PRODUCTION

in cooperation with
engine builders



CONSOLIDATED FREIGHTWAYS

USE

**SHULER
AXLES**



Two of several thousand Consolidated Trailers operating on the Coast and the Chicago-to-Coast run. Shuler One-Piece Tubular Trailer Axles contribute to the exceptionally trouble-free performance of All Consolidated Trailers.

THERE ARE NO BETTER AXLES, AT ANY PRICE!

Since 1915, Manufacturers of: *One-Piece* Tubular and Square Commercial Trailer Axles, Heavy-Duty Front Axles for Trucks, Busses, and Off-Highway Equipment, Low-Bed Machinery Trailer Axles, Heavy-Duty Vacuum and Air Brakes, Miscellaneous Forgings.

SHULER AXLE COMPANY, Incorporated, LOUISVILLE, KENTUCKY

SUBSIDIARY OF FULLER MANUFACTURING COMPANY

SALES OFFICES in DETROIT, CHICAGO, OAKLAND and TULSA

WEST COAST WAREHOUSE
Oakland, California

SOUTHWEST WAREHOUSE
Fort Worth, Texas